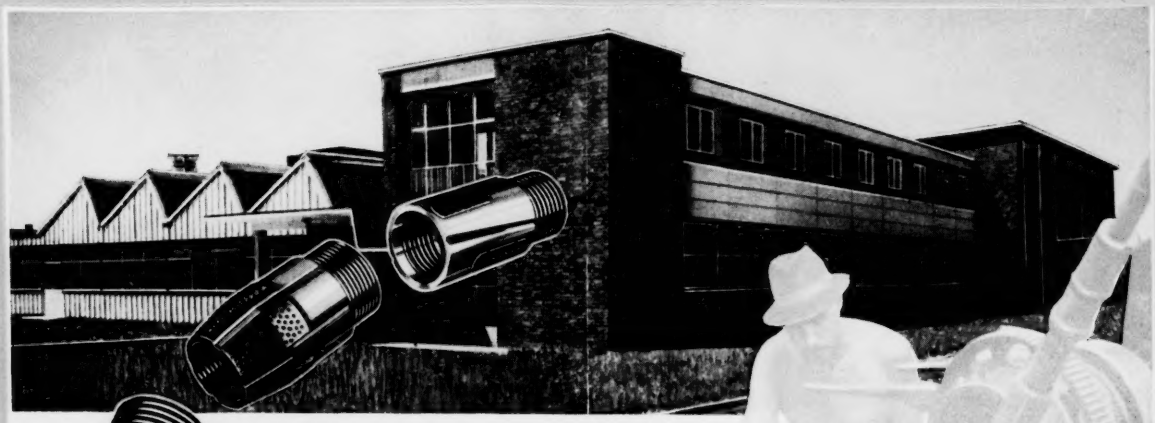
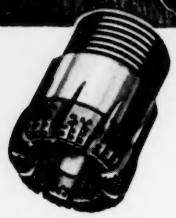
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Established 1835 — Railway & Commercial Gazette

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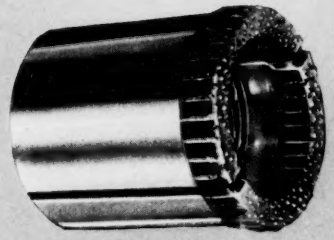
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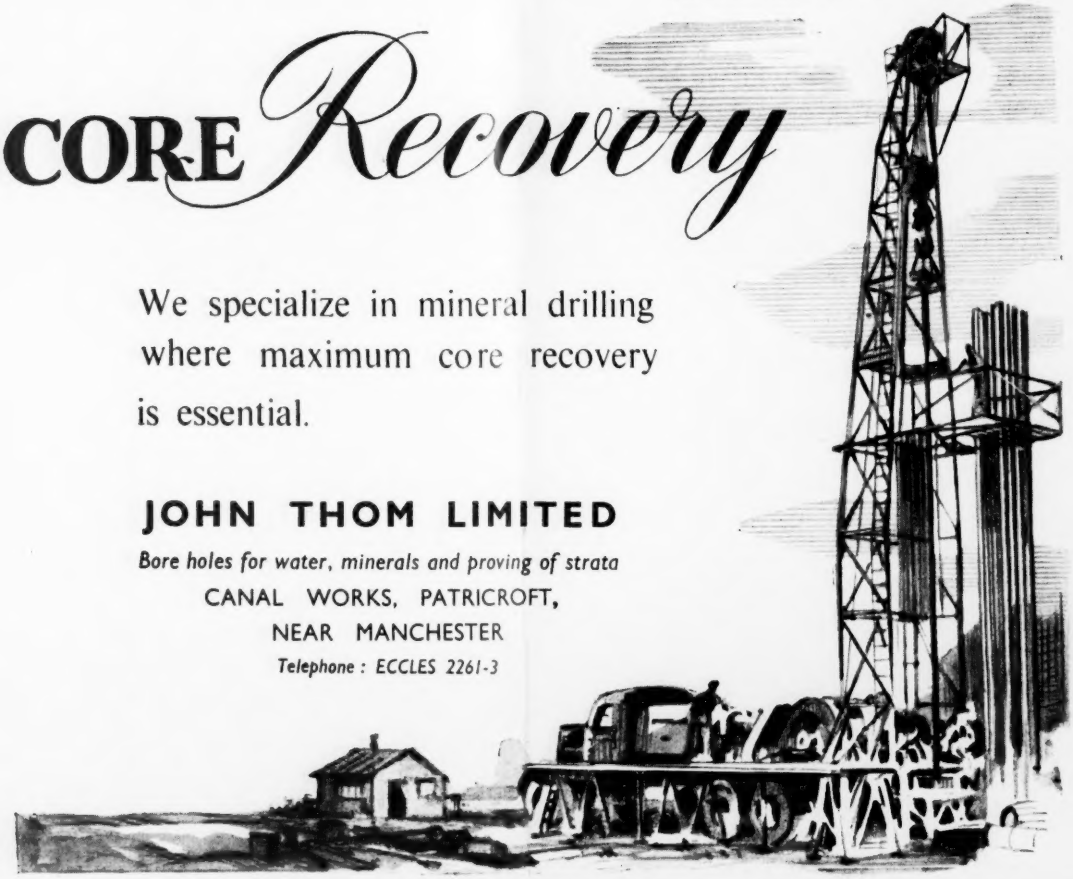


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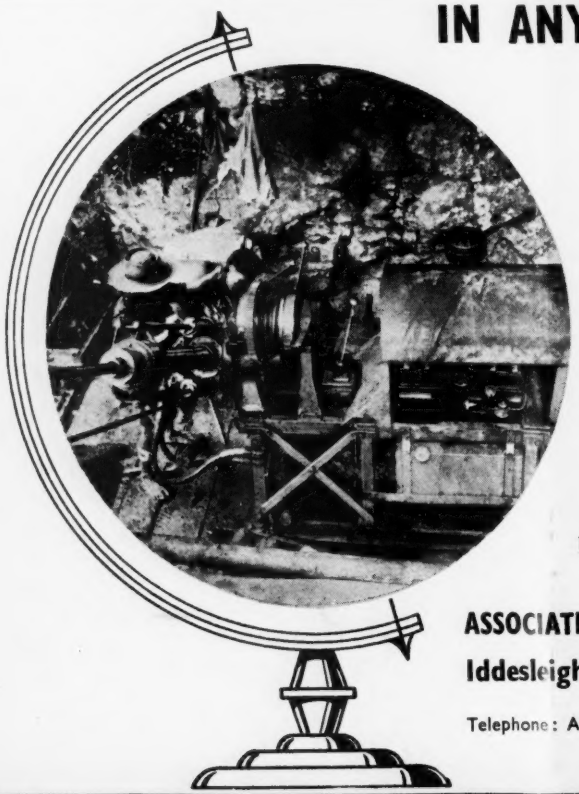
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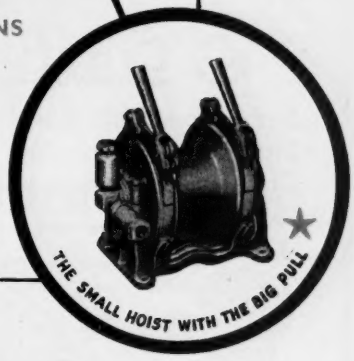
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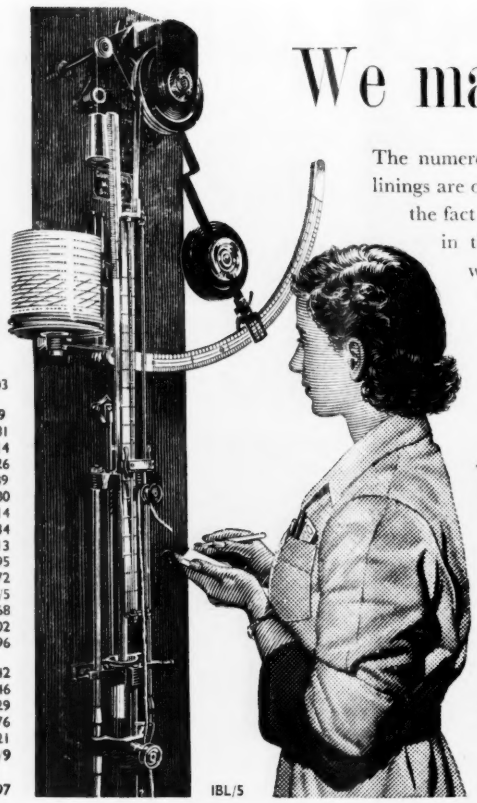
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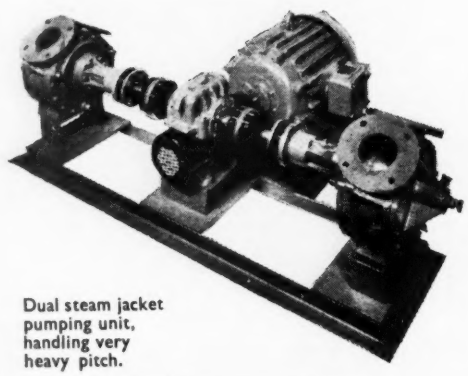
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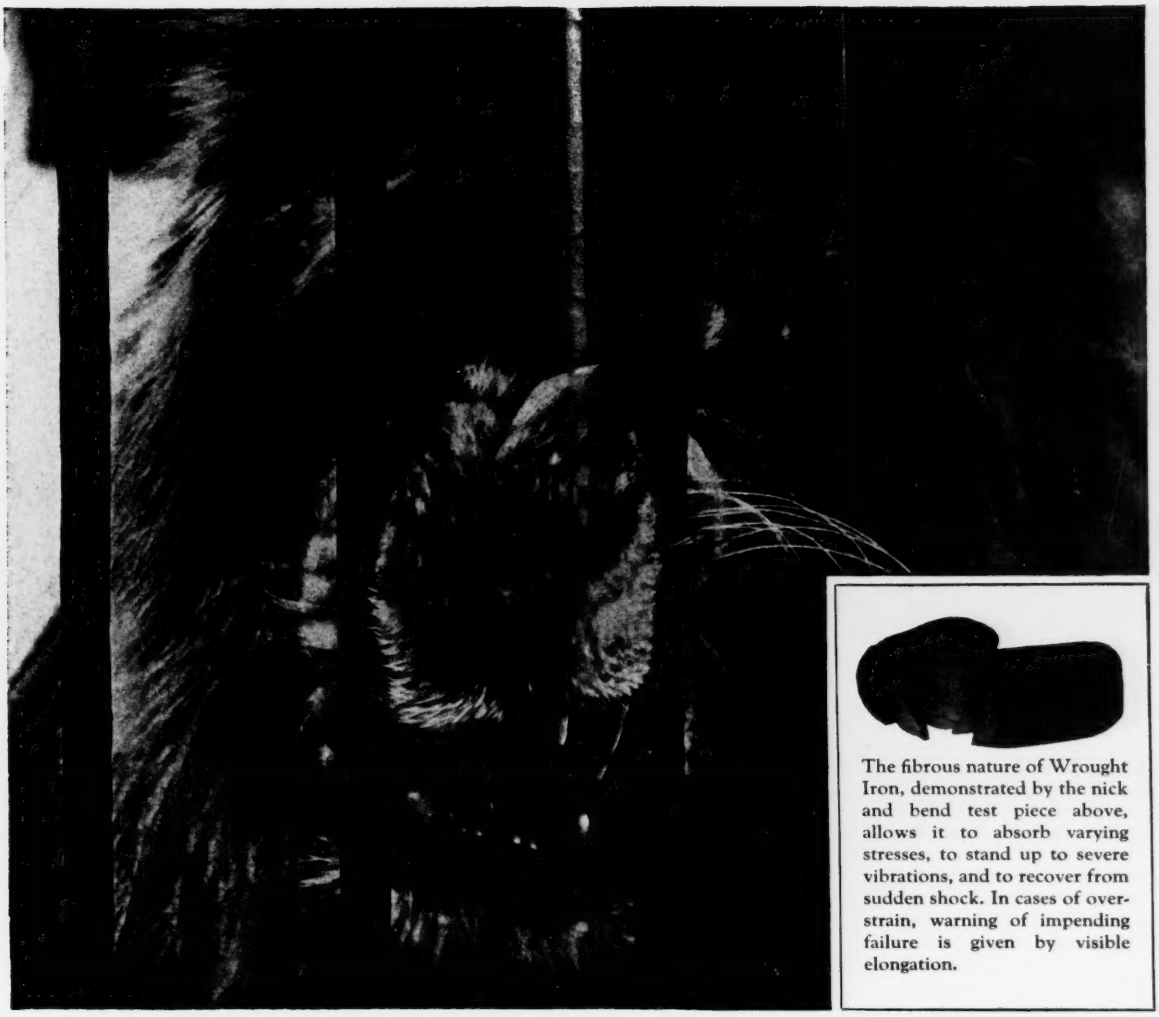
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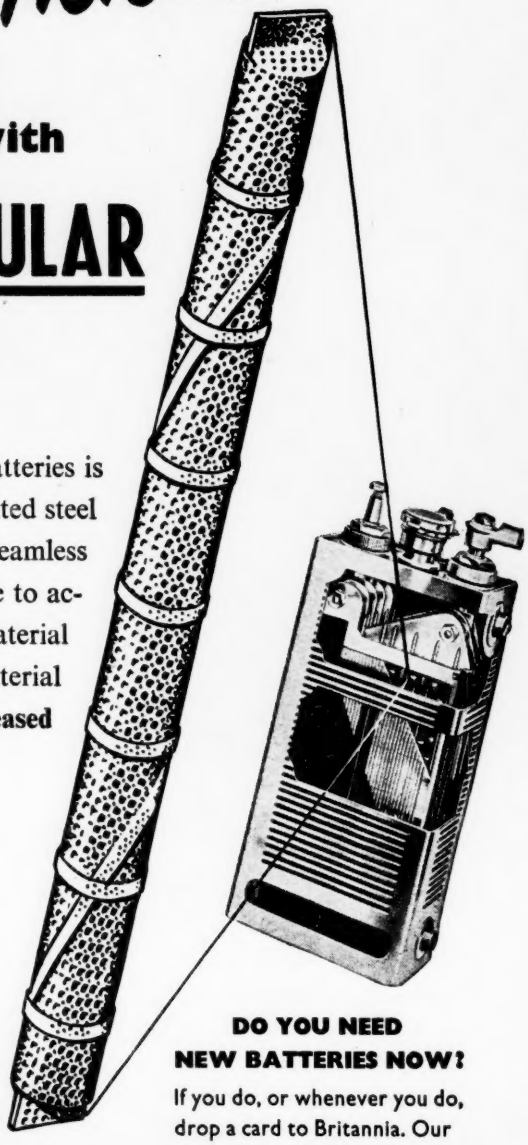
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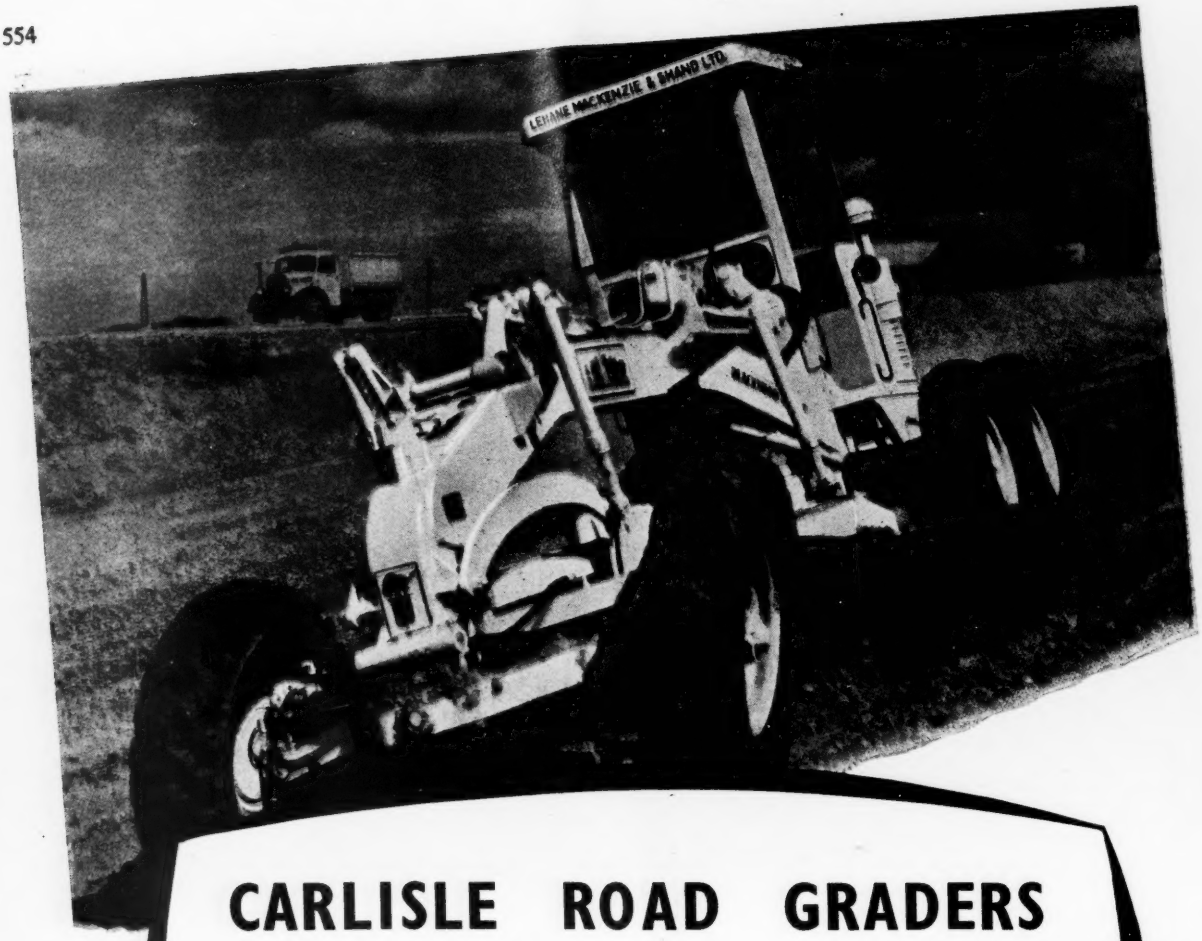
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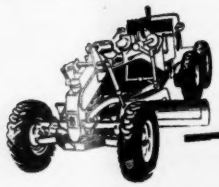
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NOTES AND COMMENTS

Politics Intrude on the Metal Markets

Satisfaction has been widely expressed, not only in this country but in the United States and elsewhere at the rapid progress which has been made in removing controls in the metal market over metal supplies and prices. But this relief has only served to reveal other influences adverse to a free economy further in the background. These are largely, if not wholly extrinsic to the mining and metal business and stem from political and financial interests and therefore promise little in the way of permanent solutions where they do not actually threaten further complexities.

There is such a constant swarm of reports of government-sponsored inquests and negotiations, the outcome of which must greatly influence metal supplies and prices, that it is difficult even to keep track of day-to-day reports, much less to pass upon their reliability and probable influence. This undesirable condition of affairs is due largely to the creeping intrusion of government policies into what, for decades, has been the chief, and ultimately the decisive, influence on world metal prices namely the course of free-world markets, which before the war used to mean, at least for the chief industrial metals, the London Metal Exchange.

A striking instance is afforded in recent weeks in copper by the apparently official reports from Santiago that Chile has decided to end her present negotiations for the sale of accumulated copper stocks to the United States for stock-piling. It had been widely assumed that an agreement had been reached with only the details still to be disclosed, and though this newspaper remained somewhat sceptical, there can be no doubt about the jolt which the latest reports gave to the market.

The effect of the great U.S. stockpile purchases with their minor reflections elsewhere is, of course, past history but the uncertainty which great accumulations (such as that of tin) may import for the future, as well as purchases of future outputs at what may prove excessive floor prices, is still with us.

In tin we are reminded by the reconvening of an International Tin Conference next week of the possibilities of fresh international cartelization. The United States has intervened to underpin the shaky structure of Bolivian economy through the medium of her tin industry and it is understood to be negotiating for further supplies from Indonesia and possibly Siam, if not also from Belgium; nor can we forget the rather vicious attacks made on foreign tin interests which had such a pronounced effect on the pre-existing price level.

In lead and zinc there is the shadow of tariff legislation to support home industry unable in some quarters to compete with production from other countries, and it is believed that the issue of tariff policy is blowing up for a big battle in Congress next year; and where the spoils of office, as in the United States, extend to the lowliest ranks, it is usually war to the knife, with little or no regard for remote economic contingencies.

Thus this somewhat sombre economic background promises little in the way of permanent solutions even if it does not threaten further complexities. Such reflections make for hesitation which is inimical to future large scale commitments by consumers as well for major development projects.

Incidentally these considerations also favour an increased turning to aluminium and the new metals generally where projects of restriction or control are still remote, and in this connection it is not without interest to compare the outlook for the short term future with the very much longer view outlined at the recent meeting of the American Mining Congress and reported on page 560 of this issue.

The Shifting Scene in the Iron and Steel Industry

The steel industry achieved an all-time record output last month, and fulfilment of the target of 17,500,000 tons for the year is now apparently assured. There has also been a sharp rise in pig iron production, but expansion of blast furnace capacity has not kept pace with the requirements of the steel makers whose planned economy envisages the increased use of pig iron to take the place of imported scrap. Ample supplies of home and imported ores are now available and the further increase of pig iron capacity is now an immediate objective.

With the notable exception of steel plates, the steel shortage may now be said to have been completely overcome. There has been a steady rise in stocks in recent months and makers and stock holders are able to meet any demands for standard sizes at short notice.

New problems now arise. What are the prospects of marketing these huge outputs of iron and steel? Home

demand is still running at a high level and home suppliers have largely replaced the large volume of material bought last year from American and other sources. But if we are importing less foreign material and making more at home, it is equally true that the volume of exports expands very slowly. Competition in foreign markets is very keen. The re-rolling industry has been troubled by this dearth of foreign business and the tube makers now admit that they too are similarly afflicted, whilst rail makers are finding it more difficult to replace contracts which are approaching completion.

Encouragement is afforded by the indication of returning animation in the domestic and overseas demand for iron castings. New orders have been booked. Short-time working in the foundries is less prevalent and a better demand has developed for both high phosphorous pig iron and cast iron scrap. Steel makers appetite for basic and haematite iron is almost insatiable and there is scarcely enough low and medium phosphorous iron to meet current requirements.

The distribution of steel plate is carefully regulated according to the urgency of the needs of individual consumers, but these measures can only mitigate the crippling effects of the shortage. There is also a very heavy demand for steel sheets and certain home deliveries may be delayed to enable the mills to complete before the end of December some heavy shipments to Argentina.

Aluminium Production in Austria

As a result of the continuous rise in production during the last few years, the United Aluminium Works Ltd., Ranshofen, Austria (Vereinigte Aluminium Werke, A.G.), have become one of the most important plants for the production of aluminium and of aluminium alloys on the Continent of Europe. During the years 1949 to 1951, the Austrian Metal Works Ltd. (Oesterreichische Metallwerke A.G.), erected a works for aluminium semis on the same site. The latter enterprise has also registered a continuous increase in its output and has been able to build up steadily improving exports. Both enterprises are State-owned; the United Aluminium Works were taken over by Austria as former German property (all formerly German-owned enterprises on Austrian territory, with the exception of those situated in the Soviet Russian zone, are now owned by the Austrian Government), and the Austrian Metal Works Ltd. were formed directly by the Government of the Austrian Republic.

The Ranshofen reduction plant has an annual capacity of 50,000 tons. Thanks to the improved electric power supply, production rose from 12,500 tonnes in 1950 to 21,000 tonnes in 1951 and to 31,500 tonnes in 1952. For the current year a production of 35,000 tonnes is foreseen and production is expected to reach 42,000 tonnes in 1954. In fact, the Ranshofen plant is the biggest consumer of electric power in Austria. In 1952 power consumption amounted to 650,000,000 kWh.; this year, it will presumably consume 720,000,000 kWh. and this figure will go up further to roughly 800,000,000 kWh. in 1954. As new Austrian hydro-electric power plants go into operation, especially the Braunau plant on the River Inn, it will be possible to cover Ranshofen's requirements out of the Austrian grid.

Crude aluminium metal produced at Ranshofen is refined there and afterwards cast into ingots for foundry purposes or into rolling ingots or extrusion billets either in pure form or as alloys. Approximately 20,000 tons of the 35,000 tons production of foundry aluminium scheduled for the current year will be supplied to the home market.

The aluminium semis plant at Ranshofen consists of a rolling mill, an extrusion plant and a number of auxiliary shops. In the rolling mill, blocks up to a weight of 750 kg. are rolled into strips up to a width of 1,500 mm. and processing is carried out on a reversing hot rolling mill. Further processing takes place on a 1,500 mm. special rolling mill of a type employed for the first time on the Continent as well as on other, smaller, rolling mills.

The two Ranshofen aluminium enterprises co-operate closely in their research and development activities and both sponsor a research and testing institute which is equipped with all facilities for metallurgical and chemical research as well as for the testing of materials. This institute is in charge of current quality control of the products turned out by both Ranshofen enterprises and important research projects are carried out in order to improve the processing of aluminium and to open up new fields for its use.

Atomic Energy Corporation formed in U.K.

The Prime Minister earlier this week presented a White Paper in Parliament announcing the formation of the new Atomic Energy Corporation, the function of which will be the speedy and economic development of atomic energy for industrial uses in the United Kingdom. The decision to form the Corporation follows the recommendations of the committee on atomic energy set up in April last under the chairmanship of Lord Waverley. These recommendations have been accepted *in toto* by the Government, and consequently responsibility for atomic energy development will be transferred to the new Corporation from the Ministry of Supply as from January 1, 1954.

Sir Edwin Plowden has been appointed to the chair of the A.E.C., and the Corporation will operate on industrial lines and will be free to manage its own working affairs, including those concerned with finance. Its overall policies, however, will be directed by the Government through Lord Salisbury, Lord President of the Council. The White Paper explained that only an organization sponsored by the Government could provide the resources necessary to undertake major operations in atomic energy development.

Although the White Paper looks forward with confidence to the time when industrial power from the atom will be a major factor in world economy, it is not unaware of the tremendous financing operations which would be required before this could be realized. Indeed, research must be the prime objective in the years ahead, for as the White Paper warns there is still much to be achieved and a great deal of work to be done.

In any event, it would appear that to the extent that nuclear power relies on uranium as a raw material this country will be dependent on overseas sources. This was made clear when the Minister of Supply, Mr. Duncan Sandys, said that while the quality of uranium ore found in Cornwall (see *Mining Journal*, February 22, 1952) was good, occurrences were in pockets and thus only small tonnages were available.

Quite apart from the discussion of nuclear energy in a parliamentary context, Sir John Cockcroft, director of the atomic energy research establishment at Harwell, said recently that he was fairly confident that nuclear energy would replace coal as the main source of Britain's industrial power. He added that if the consumption of coal in industry was maintained at the rate of the last three decades, the U.K. would soon face a serious coal shortage. But that future industrial needs appeared likely to be met by nuclear fission through reactors.

Notwithstanding the obvious future for industrial power from the atom, and the fact that this country is fitted to play a leading role in nuclear development, the lack of indigenous uranium deposits in this country must strike a note of some concern.

South Africa

(From Our Own Correspondent)

Johannesburg, November 6.

The past month has seen the publication of a series of significant progress reports by the new gold mines of the Free State and Western Transvaal [see *M.J.* Nov. 6 p. 537]. The fact emerges that underground development is progressing at an extremely high rate, with the past quarter being particularly marked by the increased footages developed on the reef horizons, thus filling in the picture of values over a greater area. The obvious point emerges that values are certainly not lagging behind the average of original borehole intersections. In fact, it looks as if most areas will turn out to be better, bearing out the experience on the West Wits line where eventual development values exceeded the best borehole indications.

PROSPECTS FOR THE O.F.S.

What in the long run is probably of greater significance than the values obtained so far is the high percentage payability of most of the Free State field, most of the mines returning well over 80 per cent and some not far off 100 per cent. This suggests very strongly that the consistent mineralization of the Witwatersrand, which, was responsible for it becoming an economic proposition, is being repeated in the new mines. At one time it was feared that the Basal reef might prove to be of a lenticular nature, approximating to the pay-shoot system of the Far East Rand, as reacted in the Sub Nigel area. Judging by present indications there are no grounds for this which makes the ultimate prospects of the field even brighter than ever.

Considerable attention is being devoted to the progress at Harmony G.M. Here development on reef to the end of September has proved 100 per cent payable averaging 653 in. dwts. Most of this development appears to have been from the ventilation shaft towards No. 3 shaft where a borehole failed to intersect payable values and not to any extent towards the eastern boundary where high values were found. The latest borehole recoveries in the centre of the property have been most encouraging.

COMPARISON OF PROFITS

A start on the Harmony uranium plant has been made and an interesting sidelight on prospects is the statement by the company that, after providing for loan redemption and interest, "U" profits should be about one-third of those from gold. This naturally raises the question of what gold mining profits will be. In consequence there in considerable slide-rule activity in progress here, but so far no really authoritative answers have been forthcoming. It is considered that the uranium content in this area runs at a relatively high level and to the south in the Virginia and Merriespruit properties. An interesting facet of the uranium plans for Virginia, incidentally, is that the sulphuric acid plant being put up there will be the largest in the Southern Hemisphere.

Stilfontein's uranium plant is being run and production of uranium and acid has started at Western Reefs. The first profit announcements will be made at the end of the year. As no uranium producers have made any mention of repayments of the loans involved in setting up the plants, it can be assumed that full-scale production has not yet been reached. Until this stage is arrived at and equilibrium between earning from the sources is established, it will remain difficult to access exactly what uranium recovery means to the South African mining industry.

Canada

(From Our Own Correspondent)

Timmins, October 17.

The decline in price of zinc and lead as well as copper is being met with courage and determination by operators throughout Canada. All plans of operation are being calculated on the basis of a belief that an era of inflated prices has come to an end and that henceforth a considerable part of the extremely low grade ore may have to be eliminated from estimated reserves. This does not necessarily pose any immediate threat to current rate of output. Neither does it appear to have placed a damper on development. The truth is that even in face of evidence of creeping deflation, the development of base metal deposits was never more vigorous and more widespread in Canada than in these closing months of 1953. The range of activity in this respect includes every province from coast to coast.

INDUSTRIAL EXPANSION OF 1953

In recording certain elements of adversity and stress the object in view is to illustrate that all is not sunshine and roses in the growth of an industrial nation. There is also night, and there are also growing pains. Viewed as a whole, the year 1953 promises to go down in the records as one of great industrial expansion in Canada, and with evidence indicative of 1954 being even better. Beginning in British Columbia on the coast of the Pacific, mineral production is close to record level. Construction of great aluminium works and power development is proceeding apace. A new $96,000,000 pipeline came into operation this week which bridges the Rock Mountains from the oilfields of Alberta to the Pacific seaboard. The growth of petroleum discoveries shows no sign of lessening in Alberta. The uranium fields of northern Saskatchewan are moving toward a place near the very forefront of production of that vital element. In Northern Manitoba there is new railway construction, power development and mining operations destined to further bolster nickel production. In Northern Ontario nickel and copper mining is at a level never before attained either here or any other place in the world. In Ontario, too, iron mining is growing at a pace scarcely dreamed possible even a few years ago. In Quebec, mining in general is growing, and with particular emphasis on the extensive iron ranges of the northern part of that province. In New Brunswick there is assurance of that province finally attaining an important place as a producer of base metals. This also holds true of Nova Scotia and Newfoundland.

EASY AVAILABILITY OF CAPITAL

A feature of progress in the mineral fields is the apparent ease with which capital is made available for development. The reasons for this appear to be three :

First is the rock formation. Time and toil has produced abundant evidence that the rocks of this nation are correctly classified as a storehouse of vast mineral wealth. Experience has taught that where one fish swims there should be more nearby.

Second is the outstanding integrity and ability displayed by mining men, engineers, geologists, and financiers, all of whom play vital parts in the discovery, development, and management of the mines. Capital flows readily to the hand of ability and integrity.

Third is the stability of government. Both at the seat of federal government at Ottawa, and in the governments of the individual provinces, there is sound administration and also great pride in achievement. This widespread political stability provides a haven of financial security and is playing no small role in the river of foreign capital now flowing in this direction.

A New Material for the Mining Industry

Although P.V.C. products in mines have been confined largely to a few special applications such as conveyor belts, helmets, cap lamp cables, etc., the advent of rigid or unplasticized P.V.C. described in the following article opens up vast new horizons for the use of this material in the mining and metallurgical industries.

Research on fires caused by belt conveyors underground has recently directed the attention of the mining industry to the fire-resistant properties of polyvinyl chloride materials. Tests carried out at the Central Research Establishment of the National Coal Board indicated that non-inflammable conveyor belts could be produced by replacing rubber with P.V.C. Various types of P.V.C. belts were tested with excellent results for inflammability by friction, inflammability by application of flame, tensiled strength, adhesion, and resistance to surface abrasion. Belting manufacturers have been studying the technical problems involved in the production of laminated or multi-ply P.V.C. belts, and this work is resulting in developments which should have an important bearing on the reduction of fire hazards underground.

A RELATIVELY NEW MATERIAL

Though one of the best-known plastics, P.V.C. is still a relatively new material. New applications are continually being developed, as chemists and technologists become increasingly familiar with the unique combinations of desirable properties which can be obtained by varying the compounding materials and the type of resin used in their preparation. The primary polyvinyl materials are powders manufactured from coal, limestone, salt and water, which are processed by plastics manufactured into a number of characteristc secondary forms. They may be calendered to produce thin sheeting for the production of protective clothing, oilskins, etc., or thick sheeting for lining tanks. Cloth or paper may be coated with P.V.C. to produce conveyor belting or protective clothing. P.V.C. covered cables and wires are well-established products and there is a growing range of extruded products such as conduit, piping, hose, tubing, and miscellaneous sections. Finally, P.V.C. can be moulded by injection or compression processes into a wide variety of flexible or rigid products.

Throughout the world the demand for this group of plastics is increasing at a very rapid rate. By the beginning of 1954 the production of primary polyvinyl materials in Britain will have increased some ten-fold since the war. Yet manufacturing capacity has barely kept pace with the growing volume of orders for P.V.C. products of every type, although primary producers such as British Geon Ltd. (the Distillers Corporation Ltd. company making Geon P.V.C. raw materials) are continually expanding their plants.

Hitherto P.V.C. has not been extensively used in the production of mining plant and equipment, doubtless because manufacturers of plastic products have been preoccupied with commitments in other fields, but, owing to its exceptional resistance to fire and corrosion, it is of particular interest to an industry in which these two problems are of major importance. Another very attractive consideration is that the material is more resistant to abrasion than all but the toughest grades of rubber.

Although P.V.C. will soften under heat, unlike rubber it will not propagate flame, as the Central Research Establishment work on conveyor belts has clearly shown. This property is again well illustrated by a recently reported test in which a piece of triple-core electric cable, insulated and sheathed with a Geon 101 composition, was suspended for ten minutes in a Bunsen flame at about 1,800 deg. C. The conductor became red hot, but the fire did not spread along the P.V.C. covering. This experiment has shown that while P.V.C. insulation can be burned if very fierce heat is applied, it does not support combustion of its own accord. There is absolutely no spreading of the fire beyond the immediate influence of the applied flame.

A comparison of the flame-retardant properties of plastic-insulated and rubber-insulated electric cable was carried out at the Fire Research Station on behalf of the British Plastics Federation. Part of the investigation related to the application of an external source of heat and was carried out substantially in accordance with the test specified by the Underwriters' Laboratories Inc. of America in their Standard for Thermo-Plastic Insulated Wires (2nd edition, March, 1945). This test showed that plastic-insulated cables of the type tested have a greatly superior resistance to external heating than have corresponding rubber-insulated cables. All the plastic insulated cables reached the standard flame retardant properties as defined by Underwriters' Laboratories Inc., while all the comparable rubber-insulated specimens failed to reach this standard when subjected to the same test.

These results suggest that fire hazards underground might be further reduced by using P.V.C. cable in preference to the normal rubber insulated product, particularly in applications where flame-proof switchgear is installed. This type of cable is also very suitable for underground use in other respects. Though its resilience is not so great as that of rubber, P.V.C. sheathing is tough and flexible and will stand up to most cable applications. It is also proof against nearly all types of corrosive agents and does not perish.

CONCENTRATION OF TOXIC GASES

Attention has been drawn to the possibility that certain toxic gases—in particular phosgene—might be given off when certain plastics are involved in fire. The concentrations of toxic gases from burning plastics, including P.V.C., have been studied by the Fire Research Station of the Department of Scientific and Industrial Research. Samples of the materials were heated in a closed vessel. The conditions were varied to cover a range of temperatures from 300 deg. C. to 1,000 deg. C., with ratios of air to plastic ranging from 5.5 to 22 litres per gramme. The principal products of combustion were carbon dioxide and carbon monoxide, and also hydrogen chloride. Traces of phosgene were found in one or two instances. The concentrations of these gases in the products of combustion are given in the following table (Fire Research, 1951. D.S.I.R. and Fire Officers' Committee), which also includes published data for safe tolerance limits.

Sample	*Temp.*	*Concen. parts per million (vol.)*			
		HCl	$COCl_2$	CO	CO_2
Polyvinyl chloride ...	300	12,900	nil	4,900	6,100
(56.8% chlorine) ...	600	15,300	1	6,900	14,800
	900	15,400	3	4,800	28,700
Polyvinyl chloride ...	300	13,500	nil	2,000	4,400
copolymer ...	600	17,700	5	10,600	21,000
(61% chlorine) ...	900	17,100	10	4,700	29,000
Safe concentrations:					
Several hours		1.0	1.0	100	5,000
Dangerous at one hour		50-100	25	1,500-2,000	—
Dangerous for short exposure		1,000-2,000	50	4,000	—

The concentrations of hydrogen chloride and carbon monoxide reported are much greater than those considered dangerous for short exposures. With regard to hydrogen chloride, however, this is considered to be no disadvantage

because hydrogen chloride produces irritation at quite low concentrations, and therefore in an actual fire it would give timely warning of its presence. The concentrations of phosgene, while above the safe limit for prolonged exposure, are below the one hour limits.

It should be noted, however, that these results were obtained under laboratory conditions, by heating P.V.C. alone in a small vessel. In a fire, there will necessarily be a mass of burning material giving off large quantities of toxic carbon monoxide and carbon dioxide as products of combustion. These, of course, present a far greater hazard than any small volume of these or other gases deriving from a relatively insignificant quantity of P.V.C. which may be exposed to the flames. Taking all factors into consideration, there seems to be no reason to fear that the combustion products of P.V.C. present a more serious toxic hazard than those of traditional materials. The Coal Board is certainly not being deterred on this account from installing P.V.C. conveyor belting in quantity in place of rubber types.

The most important properties of rock drill hose are resistance to abrasion, cutting, tearing and impact. P.V.C. possesses all these properties to a very high degree, as do the rubber compounds traditionally used for the production of rock drill hose. Vinyls would appear to offer advantages, however, in applications where hose and similar products must also be resistant to oil and petrol, sunlight, ozone, or extremely severe flexing. In the production of pneumatic hoses, for example, it is normal practice to use a tough rubber cover with fabric carcass and an inner tube of oil-resisting synthetic rubber. It is known, however, that P.V.C. materials of suitable grades are almost unaffected by oils and greases. For instance, it is reported that when certain Geon P.V.C. compounds and samples of rubber were immersed for 55 days at room temperature in such materials as mineral oil, kerosene and lubricating grease, the Geon P.V.C. materials lost from 1 to 5 per cent in weight with no direct effect on the compound itself. The rubber samples, on the other hand, gained as much as 40 to 120 per cent in weight with a considerable loss of mechanical properties.

It is claimed that P.V.C. compounds are practically unaffected by water, immersion tests on thin sheets over long periods showing only a few per cent gain in weight. Also tests by the standard natural and accelerated ageing techniques indicate that the properties of compounds based on vinyl resins are unaffected by normal ageing factors. Compounds that are highly resistant to sunlight even after long periods of exposure can be made from vinyl resins. Thus P.V.C. appears to offer a combination of properties which, in the past, has necessitated the use of synthetic elastomeric materials in conjunction with natural rubber in cases where natural rubber alone could not be successfully employed.

HIGH RESISTANCE TO CORROSIVE CHEMICALS

Further possibilities are opened up by the chemical inertness of P.V.C., which is highly resistant even to chemicals as corrosive as nitric, sulphuric and chromic acids, and strong alkalis. Because of this property P.V.C. is an excellent covering for miners' cap lamp cables, being so resistant to the chemical attack of sweat that one P.V.C. cable outlasts two rubber ones. For the same reason, the use of P.V.C. in various ways has solved many different problems presented by chemical attack in factories, refineries and industrial plant.

P.V.C. is used with satisfactory results for making pumps, valves, piping and other equipment and also as a lining material. Technically there is every reason why it should be widely adopted by the mining industry in many of its processes. It might be applied, for example, to the protection of plant and equipment that comes into contact with pulps and solutions in a gold reduction plant. It remains to be seen, however, whether in this field of applications the initial cost of installing P.V.C., though not high, would be offset by the longer service life obtainable with this material.

P.V.C. is unquestionably an ideal material for use in uranium plants. Mild steel, cast iron, and concrete are all rapidly attacked by dilute sulphuric acid, so that in designing uranium plants it is necessary either to protect them with an acid resistant covering or to use costly acid resistant materials such as stainless steel. P.V.C. has all the properties required for an economical solution to the corrosion problems encountered in the recovery of uranium from Witwatersrand ores.

SCOPE IN THE MINING INDUSTRY

The scope for vinyl materials in the mining industry has been greatly extended by the advent of rigid or unplasticized P.V.C., a new material for which a tremendous future is predicted. The omission of plasticizers from polyvinyl compositions enhances various important properties such as chemical resistance. For example, whereas plasticized P.V.C. may be used in continuous contact with most acids at moderate strength, rigid P.V.C. can withstand the same acids at much higher concentrations. Rigid P.V.C. piping is being extruded in Britain in diameters ranging from $\frac{3}{8}$ in. to $1\frac{1}{4}$ in. with varying wall thicknesses, and sizes up to 6 in. diameter or larger can be extruded if required. Ducting of still larger diameters, and units such as towers and tanks are readily fabricated by forming sheet and welding it, using a hot air torch.

The principal advantage of rigid P.V.C. piping is its outstanding resistance to atmospheric galvanic and chemical corrosion, which is, of course, a particularly important consideration when handling mine waters which are highly acidic. Large quantities of P.V.C. piping might be used, for example, in coal mines to pipe water of high acidic value from the pump to the coal face and for the ducting of methane and other gases from the coal face.

An additional attraction is the light weight of the material compared with iron or steel, with consequent saving of transport and assembly costs. Also the material is self-coloured throughout and never needs painting. Rigid P.V.C. piping can be flanged, screwed or fitted with slip-fit joints produced on site. Other advantages are lower coefficient of friction between the liquid and the inside base of the tube, thus allowing a tube of smaller diameter to be used for some applications; poor heat conduction, which retards the freezing of liquids, and resilience which allows expansion to take place. This resilience also prevents fracture due to hammering in a hydraulic system. While more expensive than cast iron and aluminium, rigid P.V.C. is competitive in price with copper, steel and lead.

Unplasticized P.V.C. is a valuable structural material and is being used very successfully for the construction of tanks, pickling cabinets, pumps, valves, acid measuring buckets, and a variety of other equipment where resistance to corrosion and ease of fabrication are prime considerations.

Miners' helmets are being fabricated in Britain by a cold pressing technique from laminated rigid P.V.C. foils 0.017 in. thick. They are light, tough and durable, and a further advantage is that they can be produced in any colour.

Though the use of P.V.C. products in mines has so far been confined largely to a few special applications such as conveyor belts, safety helmets and miners' cap lamp cables, it is evident that many opportunities exist for the profitable utilization of this extremely versatile material, which is likely to become increasingly important to the industry as its unique combinations of properties become more widely appreciated by mining engineers.

The Long Term Outlook for the Metals

At the recent meeting of the American Mining Congress held in Seattle Messrs. C. Williams and D. C. Minton, Jnr., of the Battelle Memorial Institute, presented a paper on "Research as a Foundation for Mineral Progress" which provided the kind of exercise in long-term thinking which the majority of those engaged in the mining industry, harassed as they are with day-to-day problems and short-term planning, so seldom have the time to undertake. In the following columns we quote extensively from this paper in the belief that long-term thinking of this sort is an essential corrective to the distortions which a constant attention to short-term market fluctuations tends to induce in people's minds. Readers will, of course, appreciate that the paper has been written entirely in the context of American markets, but although the time scale may be different the picture remains fundamentally true for other industrial communities. In essence this is one of a persistent long-term increase in metal consumption based on an increasing population and an improving standard of living made possible by technological development through a consistently expanding investment in research. This expansion is unlikely to favour all metals equally and the competitive position of some of the older metals may only be sustained as a result of extensive research into new uses. This general picture will be familiar enough to those who have read the Paley Report, but it cannot be too often stressed that essentially it concerns the long-term outlook and that from time to time the immediate market outlook may be, and almost certainly will be, diametrically opposite.

There are only three basic factors that influence long-range trends in minerals in the United States. Two are continually at work to enforce increased mineral production and usage, namely a constantly increasing population, and a constantly increasing standard of living. The third factor is technology, which tends also to increase total mineral production, but does not treat all metals or all minerals equally. Technology may throw great gains to some metals while acting to suppress others, and is the variable that determines what metals or minerals will prosper most in the rising tide of production and demand.

As can be demonstrated, technology is much more important to the future of any mineral than temporary market or price situations. It is also more important in its long-range effects than wars or economic recession. For although in the past wars, business recessions, and depression have caused many ups and downs in production, the trend has been ever upward.

Averaging out the high and low points in the production curve, since 1905, when population growth and that of production in terms of a uniform dollar are considered, figure 1 represents a significant presentation of the effectiveness of the American industrial system. It is shown here how production has increased much more rapidly than population, thereby sharply increasing the standards of living of the American people. The change in the slope of the production curve between 1935 and 1940 is worthy of particular attention, as this period represents the start of what has come to be known as the Technological Revolution. About this time American industry changed from one based primarily upon the exploitation of rich natural resources to one based upon the exploitation of knowledge gained through research. The result, implemented by the war, has been a tremendous upsurge in production, with the curve for gross national product leaving the population curve rapidly.

BASIC FACTORS OF INCREASED MINERAL PRODUCTION

It is therefore indicated that there are two basic factors continually at work to enforce increased mineral production and consumption in the United States, namely, a constantly increasing population, and a constantly increasing standard of living.

Simplified trend curves for metal consumption in the United States show the demand for copper, lead, zinc, and tin to have increased with time (figure 2).

It will be noted that copper, lead, and zinc have enjoyed an increasing demand, paralleling approximately the growth curve for the gross national production. The slopes of their curves since 1940, however, have not been as steep as the slope for total production. This, no doubt, reflects the inroads made by the light metals and by plastics, glass, and ceramics, in filling materials demand. Thus, while these three metals are showing excellent growth trends, they are being deflected from their maximum potential because of technological competition.

While there has been a slight upward movement to the trend curve for tin, it seems to have flattened out about 1940 at not much higher than the 1920 level. Tin is definitely not sharing in the growth pattern experienced by the other non-ferrous metals. This trend, of course, arises from the fact that American industries cannot be assured of an adequate supply of tin at prices comparable with those of substitute materials. Most of the research on tin utilization in recent years has been along the lines of conservation and substitution and has had the effect of reducing consumption *per capita*. The effectiveness of this research is demonstrated by the flattening of the tin demand curve.

INFLUENCE OF TECHNOLOGY

In figure 3, the trends curves for the production of aluminium and magnesium are compared against the curves for gross national production and population. The factor of technology is illustrated exerting dramatic influence upon the slopes of the curves. At about 1935, the curve for aluminium began a steep ascent, rising almost vertically during the war period. Magnesium began its rise about 1940. Since most of the action on the trend curves for these metals has been in recent years, making the exact slopes of their curves indecisive, actual production curves are also shown here by the dotted lines.

Steel ingot production must be considered in connection with the metals already mentioned. Although steel, as the basic metal of our economy, is highly receptive to economic trends, it is seen that when averages prevail, the trend is definitely upwards at about the same pace as gross national production and at a rate much faster than that of population growth. Thus it is shown that the long-range prospects are good for all the domestically produced metals considered. If trend curves were plotted for the other metals, similar upward turns would be indicated.

This does not mean, however, that individual metals will have easy going. On the contrary, the competition will be more difficult than ever before in history, because of the fact that a period had been entered which is characterized by technologically induced extremes. We may be certain, however, that nothing short of an unprecedented national catastrophe will stop the growth trend of total national production. The United States may have business periods of peak and reduced production, but when these are averaged out total production will march continually upwards. Population increase will assure part of this production growth, but the national demand for more and better commodities will account for the majority of the increase. With production constantly rising there will be scope for expansion of all American mineral industries. Even though plastics, glass, ceramics, and as yet unheard-of synthetics should ex-

pect greater shares of markets, there will still be opportunity for all of the older metals to maintain good growth rates.

What will be the technical bases for increasing the growth of our total national production? To have a continually increasing demand for products, new wants must be created through technology. What technical developments will increase the consumption of metals and other materials? The answer may be found in the products at present being developed in the laboratory which presage great future industrial activity. These include improvements in domestic standards, new developments in transportation, new methods of production, and new mechanisms for national defence. These demands will increase metals consumption.

In the country's capital plant, there loom even greater demands for materials. The beginning of a change to automatic production and automatic business processing is currently revealed. The present state of development of servomechanisms and electronic data-processing machines is such that automatic factories, automatic office procedures, and automatic merchandizing are inevitable. These will bring tremendous requirements for materials, including copper, aluminium, lead, zinc, steel, titanium, tin, zirconium, magnesium, the alloying elements, and even rare metals. There will be like demands for chemicals and ceramics, as American capital plant gradually changes over to electronically controlled production. In the process of adapting production lines and business procedures to electronic control, a major replacement of capital equipment will be required. With automatic industry as a general reality, the increased productivity that it brings will make additional demands upon materials.

Transportation is a heavy consumer of metals, and transportation is highly dynamic. Jet planes, rockets, increased electrification of railroads, and belt conveyor lines will require prodigious quantities of the basic old metals and great quantities also of new metals, new alloys, and new synthetic structural products. If atomic energy should be developed to its fullest expectation, it might bring fantastic demands for materials.

Many new horizons exist for specific metals. The light metals, aluminium, magnesium, and titanium, have assured futures. Aluminium, because of its good conductivity and low density, will share heavily in future electrification. It will also find increasing use in heat-exchanger mechanisms, and as a structural material, both for stationary and mobile structures. Aluminium-coated steel is in the pilot-plant stage of development and is already being used for some commercial products. Aluminium, and even magnesium, will be used increasingly for die casting.

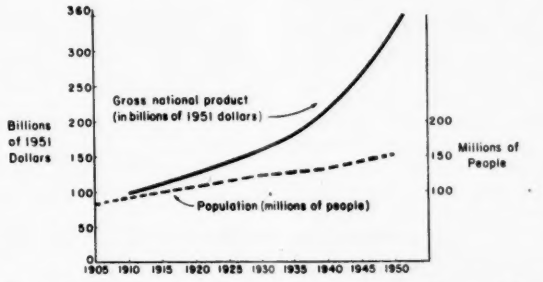


Figure 1. Increase of production in comparison with population

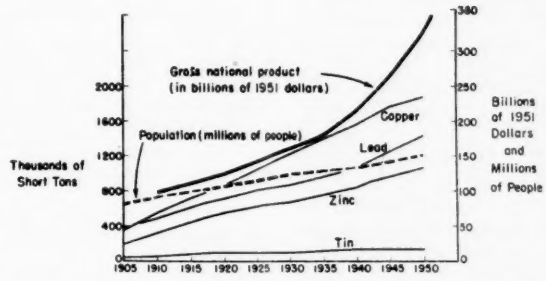


Figure 2. Increase in demand for copper, lead, tin and zinc

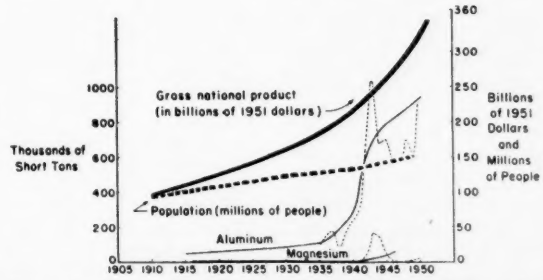


Figure 3. Production of aluminium and magnesium against gross national production and population

Magnesium has great possibilities as a structural material for aircraft, and it will find new uses in the manufacture of tools and equipment that must be lifted or carried. Titanium, because of its weight-strength ratio and corrosion resistance, has potentialities in transportation, in chemical processing, and even as a decorative metal.

The nonferrous metals, copper, lead, zinc, and tin, have so many diversified and old-established uses in which they serve so admirably that their consumption will continue to rise with the increase in population and improvement in the scale of living. Special uses in dynamic industries will cause greater than normal demand. For example, the electric-power industry has been growing, and doubtless will continue to grow, at a rate that doubles every ten years. This continuous growth will require vast quantities of the old nonferrous metals. The application of electronic data-processing and control machinery to business and industry will bring heavy demands for copper in conductors, zinc in protective applications and in mechanism parts, and lead and tin in solders. With machines in the future actually being used to replace the human brain and nervous system in production, copper may readily become the primary nerve fibre of industry. Peace time application of atomic energy could conceivably substantially increase the demand for lead and copper, in particular. Electronic developments, with their requirements for metals of unusual electrical and photoelectric properties that are now produced as by-products of zinc, copper, and lead production, will strengthen the growth potentials of nonferrous mineral industries.

Steel, as the primary metal of American economy, will enjoy unabated demand. The long-range effects of its competition will probably be to increase steel demand rather than diminish it. When a substitute for steel is developed in some application, a demand is created for steel to build the plant and machinery to produce the substitute. Steel will find increasing use in combination with other metals, plastics, concrete, and ceramics to create new products and expand markets for itself and competitors.

The horizons for the ferroalloys are obvious. Higher operating temperatures in industrial processing and in jet engines and similar types of propulsion equipment bring demands for metals with exacting temperature, corrosion, stress, and fatigue properties. The need for alloy steels and the so-called super alloys will be great. The producers of nickel, chromium, cobalt, columbium, molybdenum, tungsten, vanadium, and manganese may be well put to meet future demand for these alloying elements.

Just as aluminium and magnesium have risen from obscurity to places of prominence in the national economy,

and just as titanium and zirconium are now winning their places, so will other metallic elements attain industrial utility. In recent years, germanium, once a useless by-product of zinc production, has become a material in great demand as semiconductor in the communications field. Antimony, through recent research, may well find a place in this field with germanium. Indium, another zinc by-product metal, with potentialities as a bearing liner, solid lubricant, seal material, alloying element, and solder constituent, seems destined to become of industrial importance. Bismuth, once brittle and unworkable, can now be made into ductile wire and strip, and although silicon cannot be rendered ductile, it has possibilities as a corrosion-resistant protective coating. Lithium has good alloying properties, and magnesium-lithium alloys are particularly promising.

The big variable in the future of all minerals will be technology. In the long run, research will be the factor determining what share of new business goes to the individual metal. If the thinking is limited with regard to one metal and efforts are bent on retaining old markets without exploiting new, the competitor will certainly gain ground. If, on the other hand, thinking is expansive and a constant programme of research is carried on to find new markets, progress can be assured. Research will be highly competitive, and as was pointed out in the case of tin, research can be highly effective when directed to minimize metal consumption. Each metal, in its technology, must compete against other metals and against the non-metallics. The older non-ferrous metals, particularly, will have a battle to make their "use research" more effective than the "conservation research" of their markets.

DUTIES OF RESEARCH

Research, should be directed towards increasing supplies of minerals as well as finding new uses for them, and the development of new methods for locating underground deposits of ores are needed. There is good reason to believe that there are rich deposits still untapped which surpass in magnitude those already known.

In the processing of minerals, there is room for increased efficiencies and increased production. Economic methods for winning widely dispersed elements are particularly needed and in recent years, great progress has been made in the utilization of lower grade metal-bearing rock, The transformation of uneconomical deposits to economical ones by winning from them a multiplicity of constituents in carefully integrated operations can now be logically envisaged. New developments in physics and chemistry offer possible ways to recover metals from diffuse sources. The principle of ion exchange, for instance, may be the answer to the recovery of metals from leach solutions, waste waters, and even from the ocean.

Research is a big business, and may be considered even a major industry in its own right. This year the total U.S. research bill, including research in the agricultural and biological sciences, will surpass the $3,500,000,000 mark. About $2,000,000,000 of this is financed by the government and the balance by industry. The United States is now spending far more in one year on research than was spent in the entire decade from 1930 to 1940.

The query as to whether research will continue to expand and grow or whether the present high rate of activity is a war-induced phenomenon is a moot question. One interesting observation is made from study of a growth curve for total U.S. research, going back to the mid 1930's. This curve, unlike the growth curves for the production and consumption of materials, does not go up and down. The line is completely free from peaks and valleys. It rises gently at some spots and rapidly at others, but proceeds always upward. Each year, more was spent on research.

One is led to the conclusion that at no point has research saturated its potential. It rises uninterruptedly year after year because its cost is so slight, and its benefits so great. Last year all research, including heavy expenditures for military research, cost less than one per cent of the value of the country's total production in goods and services.

These factors, namely the uninterrupted growth of research and its distance as yet from its potential, lead research officials to feel highly optimistic about the future. Even if Government should drop its present role in the research picture, it seems highly likely that industry would speedily intensify its own efforts to nullify the defect. The benefits of research have been so well demonstrated, and at so small a cost that any reduction of effort is almost inconceivable. This great force that creates ever-expanding demands for metals seems to be assured of a dynamically progressive role in our economy for a long time to come.

Norwegian Minerals Jan.-June 1953

(From Our Own Correspondent)

Bromma, November 7.

The official report on the Norwegian mineral industry in the first half of the year shows a substantial increase in imports which were valued at 2,865,170,000 kr., as compared with 2,860,975,000 kr. in the same period of last year. Exports were valued at 1,679,986,000 kr., against 1,995,826,000 kr. in the first half of 1952.

IMPORTS

	Jan.-June 1953 (tonnes)	Jan.-June 1952 (tonnes)
Metal Waste and Ores		
Iron Ore ...	6,429	2,019
Bauxite ...	10,826	14,584
Zinc Ore ...	31,898	34,422
Manganese Ore	98,521	88,161
Chromite ...	21,240	23,363
Pig Iron ...	5,532	nil
Copper* ...	7,077	nil
Nickel ...	14,178	nil
Nickel Copper Matte	13,995	nil
Aluminium†	1,535	nil
Lead‡ ...	4,559	nil
Zinc ...	489	nil
Tin§ ...	246	nil
Base Metals		
Pig Iron ...	5,532	nil
Semi-manufactured Raw Materials		
Raw Phosphate	30,431	nil
China Clay ...	12,225	14,181
Gypsum ...	15,785	18,332
Asbestos ...	1,829	788
Cryolite ...	2,986	2,053
Magnesite ...	301	291
Precious Metals	(grms.)	(grms.)
Silver (Raw)	13,167,756	nil
Platinum ...	10,146	nil

* Copper—including 2,097 tonnes of raw metal. † Aluminium—including 1,051 tonnes of raw aluminium. ‡ Lead — including 3,981 tonnes of raw lead. § Tin—including 149 tonnes of raw metal.

EXPORTS

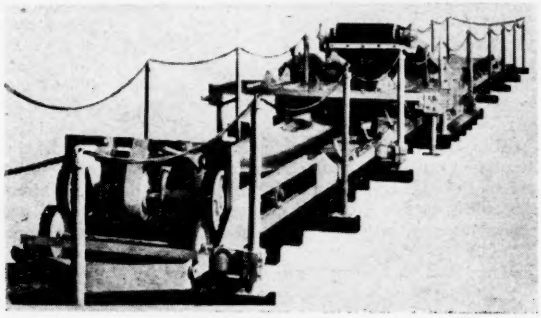
	Jan.-June 1953 (tonnes)	Jan.-June 1952 (tonnes)
Ores and Slags		
Iron Ore ...	43,392	nil
Iron and Lump Ore	23,065	15,701
Iron Ore Concentrates	344,294	139,512
Iron Slags and Residues	38,736	nil
Iron Pyrites	125,939	181,448
Purple Ore low in copper	25,426	55,110
Ores of Non-ferrous Base Metals		
Copper Matte	8,689	nil
Copper Ore	4,716	4,330
Raw Copper	4,765	4,069
Base Metals		
Pig Iron ...	14,561	18,470
Ferro-silicon	25,731	26,696
Ferro-chrome	8,294	10,964
Ferro-manganese	42,518	40,390
Ferro-silicon-manganese	6,549	11,484
Non-ferrous Base Metals		
Nickel ...	6,709	nil
Wrt. Nickel and Alloys	305	nil
Aluminium...	23,536	nil
Lead ...	72	nil
Zinc ...	14,051	9,694
Tin ...	129	nil
Precious Metals	(grms.)	(grms.)
Silver and Platinum	19,987,878	nil
	(tonnes)	(tonnes)
Sulphur ...	17,083	nil

MACHINERY AND EQUIPMENT

A New Shuttle Conveyor

A new shuttle conveyor recently developed by The American Hewitt Robins, Inc., is claimed to have possibilities in continuous mining practice. The unit is designed for use with continuous miners, to aid in the establishment of an unbroken mechanized flow of material from face to surface.

Although designed for coal mine operation, it is, nevertheless, adaptable to all kinds of mine and quarry use, and will be especially useful in those industries seeking to reduce production and transportation costs by continuous flow operation.



The Shuttle Conveyor

Extendable to 600 or 700 ft. by a rope haul, the new conveyor can follow the progress of mining while maintaining a fixed discharge or transfer point. It may receive material directly from the mining machine or from an intermediate unit such as a shuttle car, conveyor or loading machine. Proper alignment of the conveyor is assured either by small guide rollers fixed to the roof-jacks alongside the conveyor frame or by use of tracks. Operation is possible in headroom as low as 30 in.

With a minimum belt width of 24 in., the conveyor handles up to 250 tons per hour and is manufactured in lengths up to approximately 500 ft. centres.

Airborne Magnetometer Demonstration

An interesting demonstration of the airborne magnetometer was given by Hunting Geophysics Ltd., at Bovingdon, on November 5. The Hunting airborne magnetometer equipment and the method of its use were described in *The Mining Journal* of December 26, 1952. The display at Bovingdon, however, enabled a rather more detailed examination of the unit to be made at first hand.

The airborne magnetometer was developed and built by a Hunting Group company in Canada, P.S.C. Applied Research Ltd., and the technique of its operation has been pioneered by its Canadian associate, Aeromagnetic Surveys Ltd. The instrument has been in constant use over Canadian territory, mounted in both a Lockheed Hudson aircraft and a Canso flying boat. The U.K. company has fitted out a Percival Survey Prince with the magnetometer equipment, and claims to be the first British company to offer the technique commercially.

The commercial aerial survey technique is a new departure in the United Kingdom. By its operation prospecting for oil, minerals and water is considerably accelerated by the recording of a map of the magnetic field below the earth's surface.

The Hunter airborne magnetometer equipment, *inter alia*, consists of several units which work in co-operation with each other. The magnetometer detector head is situated in the tail of the aircraft, and consists of a fluxgate orientated in the direction of the earth's field by a servo system and registering changes in the total field of the earth. The magnetometer console amplifies and measures the current generated in the windings of the detector head fluxgate, and in order to accommodate great changes of magnetic force a stepping system is used. The recorder is a potentiometer recorder actuated by the current coming from the console, and this unit records in addition camera exposure.

Two 35mm. cameras are used to record the position of the aircraft in flight. One is fired continuously and one intermittently over pinpoints of note, and their exposures are recorded on the recorder as well as on the intervalometers.

The radio altimeter comprises aerials in the belly of the aircraft which send and receive pulses giving height above ground, the receiver transmitter unit which produces these pulses, and the recorder giving the height of aircraft to ground. Finally, a pilot's meter enables the pilot to maintain a constant ground-to-aircraft clearance, usually of about 500 ft.

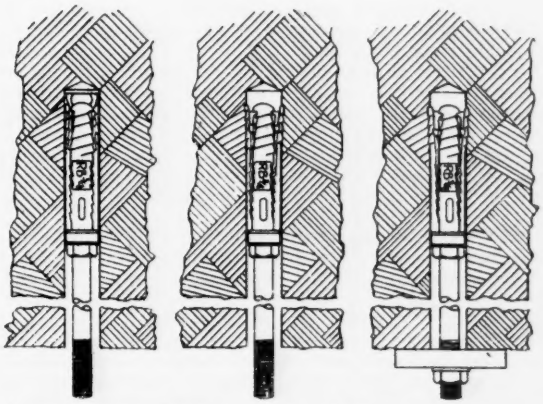
Roof Bolt Shields by "Rawlplug" Principles

The development of some form of roof bolt to replace timber support under certain conditions, is a matter which is gaining increasing attention in both the coal and metalliferous mining industries. A novel application is the experiments carried out under practical conditions by The Rawlplug Company Ltd. These experiments have taken place over the past two or three years, and have been completed to develop a suitable expansion bolt for roof support.

A test certificate has been issued by Messrs. R. H. Harry Stanger, and all tests were made in various types of unweathered stone. They are thus applicable to the average conditions that exist in any mine or tunnelling project where roof bolting could be adopted. Rawlplug roof bolts are made in two sizes, to $\frac{3}{4}$ in. Whitworth and 1 in. Whitworth, and the studs are varied in length to suit local conditions.

In the installation method, the necessary holes may be drilled with standard rotary or percussion equipment. The $\frac{3}{4}$ in. bolt requires a hole $1\frac{7}{16}$ in. to $1\frac{1}{2}$ in. diameter and the 1 in. bolt a hole of $1\frac{3}{4}$ in. to $1\frac{13}{16}$ in. diameter. The nut provided is run to the end of the stud thread, the washer is dropped on the stud and the roof bolt shield screwed on. The bolt is then pushed into the hole to required depth and expanded by turning the stud by hand. The bearer plate should then be placed over the stud, the nut run on and tightened by torque spanner or impact wrench. The correct torque for $\frac{3}{4}$ in. bolts is 150 ft./lb., and for 1 in. bolts 250 ft./lb.

The extraction process is equally simple. The nut and bearer plate is initially removed, after which the stud is unscrewed from the bolt. An extractor tool is then screwed on



Application of roof bolting shields. At left, nut and washer run to end of thread, R.B. shield screwed on and assembly pushed to end of hole; at centre, R.B. shield expanded by turning stud by hand; and at right supporting plate placed over stud before nut is tightened

the stud and pushed up into the roof bolt. This forces the conical nut to the end of the roof bolt and allows the segments to collapse. The roof bolt will then be found to be loose in the hole, and is removed by the extractor tool. A sound rock head is required when fixing wedge bolts, as is an accurate depth of hole. Wedge bolts are not recoverable.

The Rawlplug roof bolt has been used in 14 collieries in England, in tunnelling projects in the U.K. and abroad, and in ironstone mines.

METALS, MINERALS AND ALLOYS

Signs of increased political stress in the United States, looking to the mid-term elections towards the end of next year, is afforded by the subpoenaing of Mr. Truman and Mr. Burns, former Secretary of State, to testify before the un-American Activities Committee regarding the inaction of the late Democratic Administration in regard to the late Mr. H. D. White, former Assistant Secretary to the Treasury, and subsequently Executive Director of the International Monetary Fund. This, and other charges against the Democratic Party, suggests that no holds will be barred in the coming political campaign.

Marketwise, the chief event of the week was the report from Chile that that Government had decided to end the protracted negotiations for the sale of their accumulated copper stocks, which is discussed more fully in the copper section. As markets in the U.S., Canada, France and Belgium were closed on Wednesday (Armistice Day), market re-actions are still awaited, but on the Metal Exchange earlier weakness has been recovered.

COPPER.—Cable advices from Santiago at the week-end stated that Chile had decided to end present negotiations with the United States for the sale of accumulated copper stocks, variously estimated at 120,000 to 150,000 tons. The higher figure may be exaggerated in view of the extended strike at the Anaconda Company's mines and reduced output from Kennecott's Braden mine from 15,000 to 10,500 tons a month. A communique from the Chilean President's Office said that the break-off in the negotiations was limited exclusively to the copper discussions in Washington and did not indicate any rupture in commercial relations generally. The Santiago reports said that the Government was considering placing the copper on the London Metal Market, and suggested that the Chilean Government objected to the terms which the U.S. Administration had sought to impose, particularly conditions regarding the ultimate destination of the metal. The report seems to have taken the American market by surprise, and both the Chilean Ambassador in Washington and the United States Department denied that negotiations had been broken off. The question was discussed in the Chilean Senate in secret session and consequently their advice to the President in the matter has not been published. The general feeling at the moment is that Chile will have to re-open negotiations, at any rate as regards the accumulated stock, even should the Government decide to dispose of new supplies through the London Metal Exchange. The financial situation of the country seems to make it impossible to allow the present impasse to continue indefinitely. Meanwhile, Snr. Ortiz, Argentine Representative of a Soviet Trade Mission, has renewed Russian offers made last September for the immediate purchase of 50,000 tons of copper at 34 c. per lb., and to negotiate for the purchase of 250,000 tons annually for three years, in addition to the immediate offer for the purchase of 50,000 tons.

LEAD.—An impressive mobilization of producer interests is now being revealed in the United States with the opening of public hearings by the Senate Inquiry Committee on lead, November 3, and zinc, November 5, following on closed hearings earlier. The general tone of the evidence may be judged from a statement by Mr. Otto Herres, Chairman of the Lead and Zinc Committee, who charged that the mineral policies of the State Department over the past 20 years had been responsible for metal shortages during two wars and for price on stability harmful alike to producer and consumer; without some form of tariff protection the domestic lead-zinc producer faced liquidation from which no reasonable recovery could be expected. Other witnesses suggested Communist influences in official circles and criticized the stockpiling of foreign tungsten, manganese, antimony, etc.

TIN.—The London market has eased somewhat this week influenced probably for the imminence of next week's International Tin Committee's meeting at Geneva next Monday.

The Indonesian output in October is reported as 3,076 tons, the second best return for any month this year. This makes the ten months' total output 27,836 tons, compared with 28,713 in the same period last year. The output of the Longhorn smelter in October is reported as 2,751 tons, making the total for the ten months, 32,151 tons, against 14,818 tons in the same period last year.

According to reports from La Paz and Buenos Aires another attempted revolution was crushed on Monday with a number of persons killed and more injured, and hundreds of arrests. According to the Argentine report, the rebels adopted a technique familiar in other South American States aiming particularly at getting control of the air bases. The Socialist Falange Party is said to have been responsible for the revolt.

The potential production of tin in South Africa is now said to be in excess of the country's requirements and consequently the Rooiberg Minerals Development Company propose to export some of their concentrates.

ZINC.—The Managing Director of the Canadian Metal Mining Association told the Tariff Enquiry Commission that the present difficult operating conditions were not confined to the U.S. but were world-wide. The situation in Canada was in no way due to tariff concessions by the Canadian Government and the world-wide situation in lead and zinc was due to over supply created by an economic production fostered by Governmental assistance, stockpiling and the like.

It was, perhaps, somewhat unkind for the American Zinc Institute to select this time to produce a leaflet protesting against substitution of other materials for zinc "when there are, and will be, ample supplies of zinc available." The leaflet points out that world production had risen 50 per cent in the decade ended last year to a total of 2,166,000 s.tons, and that mine reserves of ore exceeded any published figures and that all reports of early exhaustion were ill-founded.

ALUMINIUM.—Despite the doubling of aluminium production in the U.S. since the start of the Korean trouble, the Secretary of the Aluminium Association, Mr. Donald White, recently expressed the confidence of the industry that increased civilian uses would take up any slack which might result from growing outputs and diminished defence requirements. In construction, he cited the complete cladding of a 26-storey skyscraper in New York in 6½ working days; more metal was going into automobiles and other transport equipment; while the economies of aluminium and wire cable were greatly extending its use in the electrical field.

COBALT.—It is reported from the United States that two officials of the Bureau of Mines are to visit Northern Rhodesia at the request of the Rhokana Corporation to work out an

U.K. PRIMARY METAL STATISTICS—SEPTEMBER

(long tons)

	Refined Copper			*Lead†*			*Slab zinc*			*Tin metal*		
	Sept. 1953	*Jan.-Sept.* 1953	*Jan.-Sept.* 1952	*Sept.* 1953	*Jan.-Sept.* 1953	*Jan.-Sept.* 1952	*Sept.* 1953	*Jan.-Sept.* 1953	*Jan.-Sept.* 1952	*Sept.* 1953	*Jan.-Sept.* 1953	*Jan.-Sept.* 1952
U.K. stocks beginning period	19,612‖	91,548§	87,251§	28,290§	23,090‖	77,167§	33,348‖	166,050§	39,659§	3,511§	4,225§	8,004§
Imports	18,658	172,967	170,932	12,482	133,467	113,614	2,823	104,908	176,766	7	938	2,687
Production	5,725	64,333	113,986	6,828	55,863	64,383	6,567	53,388	49,705	2,893*	21,423*	22,034*
Consumption	29,437*a*	224,751*a*	320,238*a*	20,153	160,177	138,083	19,643	132,140	130,838	1,820	13,645	16,829
Exports and Re-exports	4,463	7,103	444	3,800	20,282	4,864	521	9,766	104	1,826	11,307	19,668
U.K. stocks end period ‡	25,920‖	25,920‖	93,449§	22,886§	22,886‖	109,323§	28,981‖	27,981‖	133,699§	3,269§	3,269§	4,006§

(Source : British Bureau of Non-Ferrous Metal Statistics)

*Estimated by International Tin Study Group. †Includes imported virgin lead and English refined from domestic ore and secondary metal. §Including any Government stocks other than strategic reserves. ‖Excluding Government held stocks. ‡In addition U.K. stocks of blister copper at the end of September were 5'930 tons; of zinc concentrates were 49,636 tons; and of tin in ore were 3,388 tons. (*a*)Includes copper refined from secondary metal.

agreement for the recovery of cobalt and subsequently to go to the Congo in the same connection.

GERMANIUM.—The discovery of a substantial content of germanium in mines of the Tsumeb Corporation in South West Africa is reported.

MAGNESIUM.—A revolutionary and potentially immense field for the use of magnesium powder was suggested at the annual meeting of the Magnesium Association in New York recently by Mr. Joseph H. Sharon, who said that a successful engine operated by the combustion of powdered magnesium had been built. He stated that 1 lb. of magnesium fuel delivered the power equivalent of 10 gallons of petrol, thus effecting an immense reduction of weight with added safety in the case of crash. The engine was peculiarly suitable for aircraft and promised to be more economical than petrol for automobiles.

Production of magnesium in the U.S. has now been reduced to little over 6,000 tons per month, indicating a production for the current year of about 90,000 s.tons. Production is by the Dow Chemical Company from their own plant at Freeport and the Government-operated one at Velasco.

QUICKSILVER.—The Almaden administration has been moved to deny statements made before a U.S. Senate sub-committee. It denies the re-establishment of the Consorzio Europeo, the break up of which, in 1949, was final. It also denies sales of 50,000 flasks to Communist countries, and that there was a production agreement between Spain and Italy.

TITANIUM.—It is reported from Natal that a start will shortly be made in mining deposits at Ilmenite Hill near Durban. An output of 60,000 tons of ilmenite, 6,000 tons of zircon, and 3,500 tons of rutile is projected. Last March the *Cape Times* reported a discovery of ilmenite on three farms between the mouth of the Kei River and the Morgan's Bay lagoon about 35 miles N.E. of East London where a pilot concentration plant was being erected.

GOLD.—The Western Australian output in September was 70,247 f.oz. The U.S. gold output in August was 175,174 f.oz. and for the first eight months of the year 1,243,056 f.oz., compared with 1,205,885 oz. in the same period of last year.

PLATINUM METALS.—U.S. imports of platinum in the second quarter of the year were 63,536 oz., and sales to domestic consumers approximated 72,000 oz. Despite Government stock-piling refiner's and dealer's stocks increased slightly to 127,944 oz. Imports of paladium were sharply down at 60,838 oz., but refinery outputs were up. Imports of platiniferous materials from Columbia were 9,814 oz. in the period. There were gains in the sales to chemical, electrical, jewellery industries both in platinum and the other high priced metals, iridium, osmium, rhodium and ruthenium, but sales of paladium fell off.

SILVER.—United States output for silver in August was 3,023,726 f.oz., making 24,739,933 f.oz. for the first eight months of the year, compared with 26,426,819 oz. in the same period of 1952. It is stated in New York that the sale of the Cuban stock of unissued silver pesos will be completed in a week or two. Cuba bought some 50,000,000 oz. in 1934/35 for minting pesos which was set aside as a reserve and from time to time sales from this source have been effected. With the complete disposal of the supply consumers are likely to be increasingly dependent on domestically mined silver which the Treasury disposes of at 91 c. Consequently, a rising market is anticipated after the end of the year.

The London Metal Market

(From Our Metal Exchange Correspondent)

Following reports over the week-end that the Chilean/American negotiations for the sale of the Chilean surplus copper had definitely been broken off, the London market opened on Monday with a weak appearance, especially for the cash position. However, on Tuesday, Reuter published a report that spokesmen of the U.S. Government and of the Chilean Embassy had denied that the negotiations had broken down, and the Chileans suggest that their representative has only gone home for consultations with his government. The market here as a consequence has steadied somewhat and now awaits further news on this subject.

The tin market has been without any special feature, but has remained comparatively steady. Demand by consumers has not been spectacular, and the steadiness of the market may perhaps be attributable to the near approach of the Geneva Conference, at which the belief is growing that something will be achieved in the way of agreement on the methods to be adopted for the regulation of production and prices. On Thursday the Eastern price was equivalent to £636¼ per ton c.i.f. Europe.

The Continental demand for lead seems to have eased off, and at home a moderate enquiry from consumers has sufficed to keep the market fairly steady at prices rather below those ruling recently.

Zinc has been an easier market. Prompt metal has become on the scarce side and the U.K. stocks are none too large, but in the U.S.A. stocks of Prime Western continue to increase.

All markets closed on Thursday with a firmer appearance.

Closing prices and turnovers for the week are given in the following table:—

	November 5		November 12	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£617½	£620	£625	£630
Three months	£607½	£608	£612½	£617½
Settlement	£620		£627½	
Week's turnover	555 tons		305 tons	
Lead				
Current month	£94	£94¼	£94	£94¼
Three months	£90	£90¼	£90	£90¼
Week's turnover	4,375 tons		2,600 tons	
Zinc				
Current month	£75	£75¼	£76¼	£76½
Three months	£74	£74¼	£74½	£74¾
Week's turnover	5,275 tons		4,525 tons	
Copper				
Cash	£236	£237	£235½	£236
Three months	£223	£223½	£222½	£223
Settlement	£237		£236	
Week's turnover	3,175 tons		3,925 tons	

NOVEMBER 12 PRICES

COPPER, TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £210 per ton
Crude (70%) .. .. .. £200 per ton
Ore (60% basis) .. .. .. 22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99·5% £150 per ton
Bismuth (min. 4 cwt. lots) 16s. lb.
Cadmium (Empire), 13s. 10d./14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/£70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £61 15s. ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 30% 5s. 0d. lb. c.i.f.
20% 3s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 8s. 0d. per ton c.i.f.
,, ,, (concentrates) £14 8s. 0d. per ton c.i.f.
,, ,, Refractory £14 0s. 0d. per ton c.i.f.
Baluchistan Metallurgical .. £15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying nom.
,, ,, ... 245s. nom. U.K. Selling
Scheelite .. .. World buying nom.
,, ... 230s. nom. U.K. Selling
Tungsten Metal Powder .. .. 19s. 6d. nom. per lb. (98% Min. W.) (home)
Ferro-tungsten .. .. .. 16s. 6d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £52 10s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46% - 48%) .. .. .. 7s. 11d. - 8s. 7d. per unit
Brass Wire .. .. 2s. 5½d. per lb. basis
Brass Tubes, solid drawn .. 1s. 10d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Readers may be interested to hear that the new Stock Exchange gallery for visitors will be open to the public from Monday, November 16. From here a good view can be obtained of markets during working hours and an information room and explanatory charts are provided.

At the close of dealings for the old account on Tuesday, it became apparent that business during the past fortnight had been at the highest scale for 2½ years. A very large turnover was reported.

Kaffirs presented a depressing picture. The slide in the price of premium gold and little hope of any immediate recovery did not help matters. Last week's forecast that the current account would be a difficult one in Johannesburg has been fully borne out. Considerable liquidation for local account took place and blocks of shares of companies operating in the West Rand were reported on offer. By and large this trend was well resisted and it is thought that a good proportion of the selling may have been mopped up by shop and house support. The new Consolidated Goldfields profits were down by some £485,000. The company has maintained its 15 per cent dividend. The shares of Consolidated Goldfields fell sharply in the market. West Driefontein are to sink a fifth shaft and work on the fourth shaft, stopped in 1949, is to be resumed. Venterspost and Libanon are likely to incur considerable capital expenditure during the next few years. The optimistic outlook expressed by the chairman of Doornfontein assisted the shares of this company to resist the general trend. The overall values in the mine are better than had been anticipated in some quarters. Vandyk jumped on local demand in Johannesburg. Sub Nigel disposed of a considerable block of its holdings in Spaarwater during the year to June, 1953. This mine has made regular losses since it started in 1947 and it looks as though Sub Nigel may be no longer interested in a possible amalgamation.

The general tendency of Orange Free State shares was flat. Developments from Harmony, however, were encouraging. Over 5,640 ft. of the basal reef sampled to the end of October, 94.5 per cent proved payable, averaging 695 in. dwt. The main haulage on the sixth level connecting the ventilation shaft with the No. 3 shaft was holed on November 1.

West Africans were idle. Ashanti announced a high value on No. 1 level giving nearly an oz. of gold over a width of 25 ft. Ariston reported a good recovery in working profits for October which were up by some £11,000. The mine has apparently now recovered from the effects of an underground fire in August.

West Australian shares were easier but this market was encouraged by the maintained dividend from Lake View and Star.

Coppers were erratic but turned easier towards the end of the week. The metal market has been rather overshadowed by the possible liquidation of Chilean stocks in London.

Eastern tin shares turned easier where changed. The effect of the lower metal price is beginning to make itself felt. This week Kampong Lanjut decided to close down its dredge for the time being as operations had become uneconomic. Beralts were again lower on the further consideration of the tungsten price. Among Nigerians, Gold and Base Metal were quoted ex-rights to the new issue. The company has offered 4 shares for every 7 held at 2s. 9d. each. The new shares were quoted at 1¼d. premium. The company has a considerable columbite development programme in hand. In this connection, it is interesting to note that finds of columbium are reported from Northern Rhodesia and Canada. It may not be long before Nigeria has no longer a virtual monopoly in this metal.

In the lead/zinc section, Lake George reported a working loss and no dividend was paid. This had already been mostly discounted, but the market was naturally uneasy.

Consolidated Murchison were down on the lower antimony price and International Nickel again declined. Nickel has now been freed of all restrictions. This may cause some revival in the demand for the metal, but it seems inevitable that a buyers' market must develop after an interim period.

FINANCE	Price Nov. 11	+ or — on week
African & European	2	.....
Anglo American Corpn.	5½	—½
Anglo-French	17/6	.....
Anglo Transvaal Consol.	20/-	.....
Central Mining (£1 shrs.)	26/-	—6d
Consolidated Goldfields	45/-	—3/6
Consol. Mines Selection	23/9	.....
East Rand Consols	2/6	—1½d
General Mining	3¼	—⅛
H.E. Prop	36/3XD	.....
Henderson's Transvaal	7/3	+3d
Johnnies	49/9	—3d
Rand Mines	3¼	—¼
Rand Selection	28/9	—7½d
Strathmore Consol.	30/-	.....
Union Corp. (2/6 units)	24/6	—6d
Vereeniging Estates	3½	—⅛
Writs	30/-	—6d
West Wits	39/4½	—7½d
RAND GOLD		
Blyvoors	38/-	—3d
Brakpan	9/3	—3d
City Deep	15/3	—3d
Consol. Main Reef	16/10½	—7½d
Crown	31/10½	—1/3
Daggas	3½	—⅛
Doornfontein	21/3	—3d
Durban Deep	34/4½	—1/10½
E. Daggas	12/9	—6d
E. Geduld .. (4/- units)	29/4½	.....
E. Rand Props	2½	.....
Geduld	3⅛	—⅛
Govt. Areas	11/6	—3d
Grootvlei	21/3	—6d
Libanon	8/4½	—4½d
Luipaards Vlei	21/-	—9d
Marievale	16/6	—3d
Modderfontein East	16/3	—1/3
New Kleinfontein	16/10½	—7½d
New Pioneer	15/-	—1/-
Randfontein	43/9	—2/3
Robinson Deep	10/6	.....
Rose Deep	12/6	.....
Simmer & Jack	4/3	—3d
S.A. Lands	18/9	.....
Springs	3/9	—3d
Stilfontein	24/6	—1/-
Sub Nigel	38/9	—7½d
Van Dyk	5/9	+1/3
Venterspost	12/6	—3d
Viakfontein	12/-	—6d
Vogelstruisbult	29/9	—1/6
West Driefontein	6¼	—¼
W. Rand Consolidated	2⅛	.....
Western Reefs	2 1/16	—1/16
O.F.S.		
Freddies	7/9	—9d
Freddies N.	7/9	—9d
Freddies S.	6/10½	—7½d
F. S. Geduld	2⅜	—⅛
Geoffries	11/9	—1/-
Harmony	23/-	—6d
Loraine	6/3	—3d
Lydenburg Estates	11/3	—3d
Merriespruit	7/3	—3d
Middle Wits	12/3	—1/-
Ofsits	31/6	—1/3
President Brand	27/3	—6d
President Steyn	19/-	—1/9
St. Helena	12/10½	—4½d
Virginia Ord.	10/3	—9d
Welkom	14/7½	—1½d
Western Holdings	3½	—⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/8½	.....
Ariston	5/10½	.....
Ashanti	20/3	.....
Bibiani	5/-	—3d
Bremang	2/1½	.....
G.C. Main Reef	3/4½	.....
G.C. Selection Trust	6/1½	—1½d
Konongo	2/1½	.....
Lyndhurst Deep	10½d	—½d
Marlu	1/3	.....
Taquah & Abosso	2/9	.....
AUSTRALIAN GOLD		
Boulder Perseverance	2/6	.....
Gold Mines of Kalgoorlie	13/-	—3d
Great Boulder Prop.	9/-	—6d
Lake View and Star	14/-XD	—6d
Mount Morgan	17/6	—3d
North Kalgurli	6/3	—3d
Sons of Gwalia	5/9	.....
South Kalgurli	6/9	.....
Western Mining	10/9	—1½
MISCELLANEOUS GOLD		
Cam and Motor	9/4½	.....
Champion Reef	4/7½	—1½d
Falcon Mines	7/1½	.....
Globe & Phoenix	21/9	—9d
G.F. Rhodesian	5/-	.....
London & Rhodesian	5/-	+3d
Motapa	1/9	.....
Mysore	4/-	.....
Nundydroog	5/9	.....
Ooregum	4/-	—1½d
Oroville	11/6	+1½d
MISCELLANEOUS GOLD (contd.)		
St. John d'El Rey	22/6	—6d
Zams	30/9	.....
DIAMONDS & PLATINUM		
Anglo American Inv.	4	+⅛
Casts	21/3	—3d
Cons. Diam. of S.W.A.	4½	.....
De Beers Defd. Bearer	63/6	.....
De Beers Pfd. Bearer	16½	+¼
Pots Platinum	7/6	—9d
Watervaal	13/6	—3d
COPPER		
Chartered	51/3XD	+6d
Esperanza	6/3	—3d
Indian Copper	3/10½	.....
Messina	3⅜XD	—⅛
Nchanga	6⅛	+⅛
Rhod. Anglo-American	47/3XD	—2/6
Rhod. Katanga	15/-	—4½d
Rhodesian Selection	14/4½	—3d
Rhokana	18XD	—¾
Rio Tinto	20	—¼
Roan Antelope	13/7½	.....
Selection Trust	32/3	—6d
Tanks	58/6	—9d
Tharsis Sulphur Br.	42/6	.....
TIN (Eastern)		
Ayer Hitam	22/6	—7½d
Bangrin	8/-	.....
Gopeng	7/6	.....
Hongkong	5/6	.....
Ipoh	13/9	.....
Kamunting	7/10½	+1½d
Kepong Dredging	3/10½	—1½d
Kinta Tin Mines	10/-	.....
Malayan Dredging	25/6	.....
Pahang	13/-	—1½d
Pengkalen	8/-	.....
Petaling	7/3	—3d
Rambutan	10/6	.....
Siamese Tin	7/6	—6d
Southern Kinta	13/-	.....
S. Malayan	24/-	—3d
S. Tronoh	7/7½	—1½d
Sungei Kinta	10/-	.....
Tekka Taiping	4/-	.....
Tronoh	21/6	—3d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	11/-	+3d
Beralt Tin	19/4½	—1/1½
Bisichi	4/-	.....
British Tin Inv.	12/-	—3d
Ex-Lands Nigeria	3/4½	—1½d
TIN (Nigerian and Miscellaneous) contd.		
Geevor Tin	9/9	.....
Gold & Base Metal	2/10½ XR	—4½d
Jantar Nigeria	8/6	.....
Jos Tin Area	11/-	—1½d
Kaduna Prospectors	2/3	—1½d
Kaduna Syndicate	2/3	—3d
London Tin	5/1½	—1½d
United Tin	3/-	+1½d
SILVER, LEAD, ZINC		
Broken Hill South	42/6	—6d
Burma Mines	1/4½	.....
Consol. Zinc	24/3	—1/3
Lake George	8/9	—3d
Mount Isa	31/9	+6d
New Broken Hill	23/3	.....
North Broken Hill	2½	+⅛
Rhodesian Broken Hill	10/6	—1½d
San Francisco Mines	17/6	+3d
Uruwira	2/6	.....
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	43/	.....
Associated Manganese	53/6	+1/6
Cape Asbestos	22/10½	+3d
C.P. Manganese	53/1½	—1½d
Consol. Murchison	19/-	—9d
Mashaba	3d	.....
Natal Navigation	3½	.....
Rhod. Monteleo	1/3	.....
Turner & Newall	64/9	—3d
Wankie	12/-	—1½d
Witbank Colliery	3⅝	.....
CANADIAN MINES		
Dome	$28¼	—1
Hollinger	$24	—1½
Hudson Bay Mining	$76	—1
International Nickel	$70¾	—1
Mining Corpn. of Canada	£4¼	+¼
Noranda	$119½	—½
Quemont	£6¼	—¼
Yukon	3/9	.....
OIL		
Anglo-Iranian	8⅞XD	+⅛
Apex	46/9	+2/9
Attock	35/7½	—10½d
Burmah	56/6	.....
Canadian Eagle	28/7½	—7½d
Mexican Eagle	22/3	—9d
Shell (bearer)	4¾	.....
Trinidad Leasehold	32/9	—9d
T.P.D.	23/9	—3d
Ultramar	29/10½	+1/4½

COMPANY NEWS AND VIEWS

Rich Tin Ore Strike off West Siam

In our issue of October 30 last, page 505, it was stated that according to a Singapore report prospecting, off Puket in Siam, has revealed a rich tin ore deposit some six miles off the western coast. The area prospected was said to be 40 by 12 miles in extent and that operations extended to some 150 ft. in depth.

This report is extremely interesting for all indications point to the rich tin strike having been made by Tromal Prospecting Ltd, the company formed by the associated companies of the Tronoh-Malayan Tin Group for the purpose of prospecting for tin near Tongkah, Siam. We cannot state categorically that Tromal Prospecting is the company concerned, but we know of no other company or group of companies carrying out tin prospecting in the Indian Ocean off the coast of West Siam. Supporting evidence that it is the Tromal Prospecting Company is lent by the report appearing in the November 3 issue of the *American Metal Market* which states that the Tromal Prospecting Company is awaiting the granting by the Siamese Government of leases covering the areas on which payable values have been proven, and that the necessary plant and equipment are under construction. The same report says that Kramat Pulai, another of the companies in the Tronoh-Malayan Tin group, has received a permit to prospect the sea-bed off the coast of Malacca and that prospecting operations are about to commence. The report quoting the company's chairman, Mr. E. V. Pearce, adds that for some years there has been a small production of tin by Chinese working along the Malacca coast and that this has indicated the possibility of finding values in the sea-bed.

"Gold Fields" Lower Profits

Consolidated Gold Fields of South Africa is recommending the payment of 3s. per £1 share for the year to June 30 last, the same as was paid in each of the two preceding years. However, the current payment is being made on a capital increased by the issue of £300,000 £1 shares in March last, a fact reflected in the cost of the dividend on the £1 ordinary shares which absorbed £371,250 compared with £330,750 in the preceding year.

Year to June 30	*Working Profit*	*Taxation*	*Net Profit*	*To Reserves**	*Dividend†*	*Carry Forward*
	£	£	£	£	£	£
1953	1,511,642	635,000	876,642	400,000	467,531	328,825
1952	1,996,710	884,000	1,112,710	670,000	425,250	319,714

* Allocated as between staff pensions reserve £100,000 (1952 - £170,000) depreciation reserve £300,000 (1952 - £300,000) and general reserve nil (1952 - £200,000).
† Includes total net distribution paid as to £96,281 (1952 - £94,500) for preference dividends and £371,250 (1952 - £330,750) for ordinary dividend.

While the contraction in profit was approximately £500,000, in view of the market conditions prevailing last year not only in relation to Kaffirs but also to some of the base metal producers in its portfolio, the figures now announced can be considered satisfactory. In any event, shareholders were warned by the chairman, Mr. Robert Annan, at last year's annual meeting, that the 1951-52 figures were rather exceptional in that profits enjoyed the assistance of a non-recurring benefit in the form of a credit arising from the company's realization of its entire shareholding in Southern European Metal Corporation.

The dividend will be paid on December 15 to all those registered on November 18 and to holders of coupon No. 57. All figures are subject to audit. The report and accounts will be posted on November 17.

Lake View Star Pays Less

Lake View and Star, in a preliminary profit statement, have announced the recommendation of a final dividend of 1s. 6d. per 4s. share, making, with the two interim dividends already paid, a total distribution of 2s. 3d. per share for the year ended June 30 last. This compares with dividend payments totalling 2s. 6d. per share in the preceding year.

Profit from mining operations was £164,600 (£151,975), struck after charging £28,996 (£26,176) for depreciation and providing £272,000 (£304,000) for taxation to which, however, was added an amount of £10,000 (£29,000) being a provision for taxation no longer required. The dividend payments required a total net amount of £173,250 (£183,750) leaving the carry forward slightly lower at £48,003 compared with £49,428 brought in. In addition, there was a non-mining credit balance carried forward of £20,477 compared with £15,668. The final dividend will be paid on December 19 to all those registered on November 12 and to those holding coupon No. 55. Meeting, London, December 15.

Lake George Passes Dividend

Lake George Mining Corporation in a preliminary profit statement giving the group results for the year ended June 30 last have announced a loss of £9,099 compared with a profit of £389,727, after providing for tax liabilities of £694,623, in the preceding year.

The loss is attributable to the fall in revenue sustained by the operating company in Australia, Lake George Mines Pty., as a result of the decline in base metal prices. In these circumstances no dividend payment has been recommended in respect of the year which compares with an interim of 30 per cent and a final of 60 per cent, making 90 per cent per 5s. share on the £550,000 issued capital, in the previous year.

After bringing back provisions for taxation no longer required of £53,870 (nil) and adding unappropriated profits from last year of £226,921 there remains £271,692 from which £200,000 (£69,600) was appropriated to reserves by the subsidiary leaving £71,692 to be carried forward.

It may be recalled that in March last, the company announced that because of the lower lead and zinc prices the directors had decided to defer consideration of payment of an interim dividend, pending the result of operations for the year. Mr. R. M. P. Preston is chairman. Meeting, December 11.

Gold and Base Share Offer

Gold and Base Metal Mines of Nigeria have announced in a circular letter, accompanied by a letter of rights, that they are offering to existing shareholders the balance of the company's unissued capital to provide £218,273 of new money for the purpose of financing the company's programme for the expansion of columbite production from its columbite properties in Nigeria.

The essential details are that the company is issuing the balance of its unissued capital of 1,649,258 2s. 6d. shares in the ratio of four new shares for every seven 2s. 6d. units held at 2s. 9d. per share. Of the total number of unissued shares offered to shareholders 1,600,000 new shares can be subscribed for as of right and the remaining 49,258 shares will be available to stockholders for subscription at the same price in addition to those to which they are entitled by way of rights. The offer will raise the company's issued capital to £600,000 and the new shares will rank for dividends after allotment. As aforementioned the proceeds of the issue will amount to £218,273, after providing for all expenses in connection with the issue, which are estimated at £8,500.

The chief object of the issue is to provide the company with the additional capital necessary to meet its commitments under a contract concluded with the United States Government, acting through the Defense Materials Procurement Agency, whereby D.M.P.A. advances £250,000 to finance the development and equipment of the company's Liruei-n-Kano areas. In return the company is required to spend £100,000 on these areas in keeping with advances made by the D.M.P.A. Advances already made, covering the period to December 31 next, total £142,750.

The announcement states that Gold and Base Metal Mines of Nigeria has entered into a contract with the D.M.P.A. for the sale of its estimated columbite production for the current year at a price equivalent to £2,252 per s.ton and have negotiated a further contract for deliveries of columbite commencing in 1954 and continuing until the end of 1956 to sell its estimated columbite production at £2,180 per s.ton containing 73 per cent grade delivered by June 30, 1955, and at a price of £2,107 per s.ton delivered between July 1, 1955, and December 31, 1956. It is estimated that deliveries under this contract will have a value well in excess of £1,000,000 and the company's profits therefore, "should show a material increase."

The company is now one of the largest producers of columbite with an anticipated production of 200 s.tons annually by 1955.

Full details of the new share issue and the company's position vis-à-vis the D.M.P.A. and the development of its columbite areas will be found on page 572 of this issue.

Tekka Maintains Steady Progress

There were several commendable, though unspectacular, features contained in the report and accounts of Tekka for the year ended March 31 last. The tonnage treated was greater and with yield unchanged and the cost per cubic yard being fractionally lower the company was able to reap the benefits of the small increase in the total production of tin ore which also received the assistance of an improvement in the price received per ton by approximately £37 per ton.

Thus the mining revenue improved although other income declined by roughly £3,000 to £9,500 so that the total income for the year at £85,202 was virtually the same as in the preceding year, when the figure recorded was £85,148. Mining costs were lower but this was offset by the higher tax attracted and the net profit figure was not much above that attained in the preceding year. Nevertheless, it was sufficient to provide for the allocation of £5,205 (£5,000) to general reserve, £1,183 (£3,042) to be written off capital expenditure, £9,636 (£9,413) to cover the total net distribution, and to raise the carry forward by approximately £220.

Year to	Per Cubic Yard			Output	Per Ton Ore	
Mar. 31	Treated (000)	Yield (lb.)	Cost s. d.	(Tons)	Cost £	Price £
1953	482	0.51	1 5	109	313	542
1952	462	0.51	1 5	103	318	506

The company's claim for war damage compensation has now been agreed. The company's claims on account of rehabilitation expenditure have now been agreed and the awards totalled £12,260. In this connection the Chairman's statement says that it is therefore apparent that at least £12,705 is irrecoverable and this amount has been transferred from the general reserve account to the balance sheet and the rehabilitation expenses in suspense have been lessened by a similar amount.

Year to Mar. 31	Mining Revenue £	Mining Costs £	Taxation £	Net Profit £	Dividend %	Carry Forward £
1953	75,684	47,318	19,089	16,105	5	27,220
1952	72,482	49,061	17,685	15,709	5	27,001

The company continues to maintain its production in the current year and at the end of the first six months, it produced a total of 69¼ tons of tin ore compared with 55¼ tons tin ore produced in the first six months of the year under review. Mr. Donald W. Thomas is chairman. Meeting, Redruth, Cornwall, November 18.

Anglo-Burmah Tin Show Small Loss

Preliminary profit statement issued by the Anglo-Burmah Tin Company, dealing with the financial results obtained for the year ended May 31 last, showed that gross revenue for the year was, in fact, £19,537 higher than in the previous year. However, as the footnote to the table below points out, the total income in the preceding year was augmented by the addition of £41,917 received by way of an insurance claim.

Year to May 31	Gross Revenue £	Expenditure* £	Other Costs† £	Taxation £	Net Profit £	Carry Forward £
1953	70,351	67,062	12,139	397	L9,247	Dr 1,217
1952	92,731‡	66,914	16,609	6,150	3,058	Cr 8,030

* In Burma and London. † Includes debenture interest of £476 (1952 - £4,235) and depreciation of £11,663 (1952 - £12,374).
‡ Includes £41,917 received from insurance claim for consequential loss.
L indicates a loss. Dr indicates a debit and Cr a credit.

The improved gross revenue figure was, doubtless, due to the result of production from tribute operations increasing by 43 tons to 116 tons for the year. Nevertheless, after providing for depreciation, debenture interest and taxation, a net loss of £9,247 was incurred on the year's operations which compares with a profit of £3,058 in the preceding year. The carry forward at the financial year end showed a debit of £1,217 against a credit balance brought in of £8,030.

During the first three months of the current year production of tin ore from tribute operations was 42 tons against 32 tons in the corresponding period for the year under review. The report and accounts will be posted on November 23. Meeting, London, December 16.

Harrisons and Crosfield Pays More

Preliminary profit statement from Harrisons and Crosfield, whose earnings are chiefly derived from its merchanting and plantation interests overseas, are recommending the payment of a final dividend on the deferred ordinary stock of 27½ per cent, making 35 per cent for the year ended June 30 last, which compares with a total distribution of 30 per cent for each of the two preceding years.

The group net profit was £672,504 against £687,114. The alocation to reserves totalled £497,000 against £731,537, of which £206,338 arose from provisions written back.

The preliminary statement also announced that Treasury consent had been obtained to the issue of £500,000 deferred ordinary £1 shares by way of capitalization of reserves. The directors' proposal is to issue these deferred ordinary shares as bonus shares to holders of the existing deferred ordinary stock in the ratio of one new deferred ordinary for each £1 unit held. In due course the new shares will be converted into stock units of £1 each.

Sir Eric Miller is chairman. Meeting, London, December 14.

Trepca Mines Make Steady Progress

Although the total income of Trepca Mines for the year ended September 30 last showed a substantial improvement on that obtained in the preceding year, the gross revenue figure shown in the table below for the year under review included an amount of £26,902 received by way of profit on realization of Government securities (including the recovery of £24,400 previously written off) and the sum of £5,504 written back on recovery of a debt.

Year to Sept. 30	Gross Revenue £	Working Profit £	Taxation £	Net Profit £	To Reserves* £	Carry Forward £
1953	60,539	54,600	7,219	47,381	45,000	193,128
1952	36,516	15,928	1,921	14,007	62,000	190,747

* Allocated as between investment reserve £25,000 (1952 - £50,000) and exploration reserve £20,000 (1952 - £12,000).

The preliminary profit statement also announced that the depreciation of investments amounting to £18,691 (£50,975) was charged to investment reserve leaving a balance of £9,533 (£3,224) on that reserve, after taking into account the allocation of £25,000 (£50,000) out of the year's profits to investment reserve as noted in the footnote to the above table. Expenditure during the year on mining investigations rose to £18,497 (£12,261) which has been charged to exploration reserve, leaving a balance of £3,668 (£2,165) on that reserve after the allocation out of the year's profits, as explained in the footnote to the above table.

The report and accounts were posted on November 12. Meeting, London, December 9.

London and African Mining Trust

London and African Mining Trust has issued a preliminary profit statement showing its financial results, subject to audit, for the year ended September 30 last.

Year to Sept. 30	Net Profit £	Available £	Dividend Distribution %	Dividend Distribution £	To Reserve £	Carry Forward £
1953	15,658	17,933	6¼	6,446	10,000	1,487
1952	17,197	17,197	5	4,922	10,000	2,275

The dividend warrants will be posted on December 15 to all those registered on November 25. Meeting, provisionally arranged for December 14.

"Indians" in October

The October mine returns from the four Kolar Gold Field companies contain little of interest. Nundydroog appears to be the only company in a position to produce more gold than in the preceding year but without monthly profit figures to indicate the cost-revenue relationship, what this means to shareholders is anybody's guess. Ooregum announced that 236 oz. were produced from miscellaneous ore and a further 708 oz. were yielded from clean-up operations.

Company	October, 1953 Tons (000)	October, 1953 Yield (oz.)	Months since year end	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)
Champion Reef ..	12	5,312	10	111	43,544	131	59,003
Mysore	15	5,359	10	155	58,542	174	61,663
Nundydroog*	22	6,238	10	209	57,880	217	54,951
Ooregum†	0·4	944	10	66	19,459	105	29,676

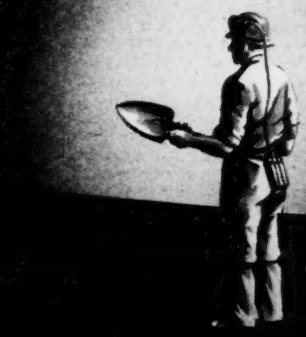
* Includes tailings. † Miscellaneous ore and clean up only.

THE MINERAL RESOURCES DIVISION, Colonial Geological Surveys, Imperial Institute, London, S.W.7, invite applications for the post of SENIOR SCIENTIFIC OFFICER (Male). Qualifications: 1st or 2nd Class Honours Degree in Chemistry or equivalent. Required to take part in a special investigation needing a sound knowledge of mineral chemistry and a good general experience of mineral analysis. A knowledge of physical methods applicable to inorganic analysis would be an advantage. Inclusive remuneration £990-£1,161 (for a 45½-hour week). Point of entry determined by qualifications and experience. F.S.S.U. Superannuation. Application forms from M.L.M.S., Technical and Scientific Register (K), 26 King Street, London, S.W.1, quoting F434/53A.

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HARMONY GOLD MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

At the third Annual General Meeting of shareholders, held in Johannesburg, on November 6, **Mr. P. H. Anderson,** the Chairman, in the course of his remarks said:

Development continues to indicate good mining conditions and up to the end of October the total development footage accomplished since these operations started in February was 14,550 ft. 5,866 ft. had been advanced on the Basal Reef horizon, and of this 5,640 ft. had been sampled, 5,330 ft., or 94.5 per cent, proving payable, averaging 15.33 dwt. over a channel width of 43 in., equal to 659 in. dwt.

The main haulage on 6 level to connect the Ventilation Shaft with No. 3 Shaft was holed five days ago on November 1. Consequently, the various restrictions applying to a single entry mine have been removed and, though the scale of operations can be only slightly increased due to the limited hoisting capacity of the Ventilation Shaft, underground conditions will be considerably improved. 16 Winze, which is being sunk also to connect the shafts, had 2,840 ft. to go at the end of October and is not expected to hole until about September, 1954.

In the Ventilation Shaft area good progress continues to be made with the development of the initial stoping area. 6 level drive has now been stopped temporarily while work is concentrated on footwall haulages and on 15, 16 and 17 raises. These three raises are spaced about 800 ft. apart and are being put up to 2 level, a distance of 1,750 ft. up dip to the east of 6 level. If progress continues to be made according to plan, it is expected that by the time the mine is scheduled to go to production in July, 1954, a block of ore 1,750 ft. by 1,600 ft. will have been opened up in this area, and a fair proportion of the 10,500 ft. of face in the three raises will have been prepared for stoping. Development rock is being hoisted and dumped on a stockpile at the Ventilation Shaft and this ore, together with that from mining operations, will be transported to the reduction plant by road pending the commissioning of No. 3 Shaft.

No. 3 Shaft has progressed satisfactorily and at the end of October had reached a depth of 5,247 ft., leaving 130 ft. to be sunk to its final depth. The ore and waste boxes and portions of the ore and waste pass systems are nearing completion, and most of the stations and a temporary pump chamber required for the initial stages of operations have been completed. Equipping should commence in January and the shaft is expected to be ready for operation as the main hoisting shaft shortly after production commences.

Construction of the first 45,000 ton unit of the reduction plant is well advanced, although there have been one or two minor delays in erection. This unit is scheduled to start operating in July, 1954, and a second unit of a similar size a year later.

A suitable site for this shaft has been located by the drilling of borehole L.R.9 which has also yielded encouraging reef values. The results of the second deflection of the borehole were published yesterday and these, taken in conjunction with the results of the original borehole and the first deflection (which was drilled from just above the Basal Reef) gave the following averages: the two intersections of the Leader Reef at a borehole depth of 4,978 ft. averaged 0.9 dwt. over 56 in., equal to 50 in. dwt. The three intersections of the Basal Reef at a borehole depth of 5,028 ft. averaged 18.34 dwt. over 71 in., equal to 1,302 in. dwt. In addition, interesting values were obtained on the "A" Reef horizon at a depth of 4,555 ft. In the original borehole this reef assayed 5.3 dwt. over 88 in., equal to 466 in. dwt., and in the second deflection 4.2 dwt. over 84 in., equal to 353 in. dwt. As all the other boreholes on the Harmony property have given unpayable results on this horizon it would appear that the pay zone located by borehole L.R.9 is of limited extent. It should, however, be possible to test the potentialities of this payable zone at some time in the future as the proposed No. 2 shaft is likely to intersect it.

The construction of the uranium plant to handle the residues from the first two units of the gold reduction plant is making fairly steady progress but it will probably not be commissioned until two or three months after the gold plant has commenced operations. Shareholders will have noticed from the recently issued prospectus that uranium production, although it is only a by-product of gold production, is expected to yield considerable additional profits to the company. Values have been encouraging and it is estimated in the light of ore disclosures to date that the profits, after allowing for loan redemption and interest, earned from the uranium plant during the period of the agreement with the Minister of Mines will be of the order of one-third of the working profits from gold mining.

The report and accounts were adopted.



KOLAR GOLD MINING COMPANIES

(MYSORE, CHAMPION REEF, OOREGUM, NUNDYDROOG)

At the annual general meetings of the above named companies, held at Ooregum, Mysore State, on October 29, 1953, at which the results for the year ended December 31 1952, were considered, **Mr. J. K. Lindsay,** in the Chair, referred to the accounts of the companies. The following dividends have been paid: Mysore 5 per cent; Champion Reef 6 per cent; Ooregum Nil; Nundydroog 5½ per cent.

Since the close of the year under review, the market values of the U.K. Government Securities held by the companies have improved and on October 15, 1953, were: Mysore £152,635; Champion Reef £120,824; Ooregum £81,595; Nundydroog £135,750.

During the current year production of all the mines during June was affected by a power cut due to water shortage. Otherwise the production of Mysore and Nundydroog Mines has been satisfactory. The Champion Reef Mine's production has also been affected by the rockbursts and fire in 1952. However, the output is gradually increasing as the stopes suspended after the rockbursts are gradually returning to production.

To the end of September, 1953, the price received for gold averaged approximately Rs.234 per oz. but since then the bullion market has again been depressed and the price of gold has fallen to Rs.214 per oz.

At the Mysore and Nundydroog meetings, Mr. Lindsay recalled the remarks of the chairman last year regarding the intention to put these companies into voluntary liquidation as soon as it became possible to do so without jeopardizing the position of the respective K.G.F. Companies. It is expected it will be possible for the Mysore K.G.F. Company to dispense with the support of the Holding Company in the early part of next year provided no unforeseen circumstances arise in the meantime. The integration of the fiscal system of the Mysore State with that of the Central Government has involved a new basis of income tax computations and this has resulted in considerable delay in the finalization of the income tax assessments. Although the liability for income tax up to the date of transfer of assets to the K.G.F. Company has been taken over by that company under the Sale Agreement, it will be appreciated that until the assessments have been settled it will not be possible to distribute all the assets.

The financial position of the Nundydroog K.G.F. Company is not yet good enough to dispense with the support of the Holding Company especially in view of the capital expenditure which will be necessary for the proper development of the West Reefs. For this reason and because of delay in the settlement of the income tax assessments, the directors regret they are not yet in a position to recommend that the Nundydroog Company should be put into liquidation in the immediate future. Such a recommendation will be made as soon as practicable.

At the Champion Reef and Ooregum meetings, the chairman referred to the termination of the Champion Reef/Ooregum Joint Operation on September 30 and the completion of the Sale Agreement by which Champion Reef purchased the Ooregum leases and buildings, machinery and plant for Rs.21 lacs (Re. 1 lac equals approximately £7,500). Champion Reef has taken over the liability in respect of the debenture of Rs.3.17 lacs in favour of the Mysore Government and the balance is to be paid by four equal instalments, the first of which has been paid and the last of which is due on March 31, 1955. In addition Champion Reef has paid Rs.12 lacs for Ooregum's share of materials and stores.

At the Ooregum meeting, Mr. Lindsay said that to the great regret of all concerned the mine was closed on July 9 after over 60 years' successful operation. The result for the first nine months of 1953 was an estimated loss of Rs.3.31 lacs and the payments to labour towards compensation for loss of employment, etc., cost a further Rs.23.16 lacs. It is estimated that a further amount of Rs.6.63 lacs will be payable in this respect.

The sale of the remaining assets of the Ooregum K.G.F. Company and the clean-up of the mill have still to be completed, and it is not possible at this stage to estimate the return which shareholders may expect on their shares when the company is liquidated.

The intention is to put the Ooregum K.G.F. Company into liquidation as soon as the clean-up and dismantling of the mill have been completed.

The report and accounts of the four companies were adopted.

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DIVIDEND No. 34 — COUPON No. 35

With reference to the notice of declaration of dividend advertised in the Press on October 29, 1953, the dividend on stock represented by stock warrants to bearer will be paid on or after December 17, 1953, upon surrender of Coupon No. 35 at Barclays Bank (Dominion, Colonial and Overseas), Circus Place, London Wall, London, E.C.2, where listing forms may be obtained.

Coupons may also be presented for payment in French currency at Banque de l'Union Parisienne, 6 and 8 Boulevard Haussmann, Paris, 9e.

Coupons presented at Barclays Bank (Dominion, Colonial and Overseas) must be left four clear days for examination and may be presented any day (Saturday excepted) between the hours of 11 a.m. and 2 p.m.

United Kingdom Income Tax as indicated hereunder will be deducted from dividends payable in respect of stock warrant coupons presented for payment in London unless accompanied by Inland Revenue declarations. Where such deduction is made, the net amount of the dividend will be 3s. 4.452d. per 10s. unit of stock, viz.:

	per 10s. unit of stock s.	d.
Amount of dividend declared	4	9
Less United Kingdom Income Tax at 4s. 6d. in the £ on the Gross amount of the dividend of 6s. 1.548d.	1	4.548
Net dividend	3	4.452

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Registrars and Transfer Agents in England,

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Assistant London Secretary.

11, Old Jewry,
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November 11, 1953.

NOTE.—The London Paying Agents have been requested by the Commissioners of Inland Revenue to state:

Under the provisions of Section 348 and the 17th schedule of the Income Tax Act, 1952, as amended by Section 26 of the Finance Act, 1953, relating to " Unilateral Relief " from Double Taxation, Northern Rhodesian tax applicable to the Dividend is allowable as a credit against United Kingdom tax payable in respect of the Dividend.

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To the Members

GOLD & BASE METAL MINES OF NIGERIA LIMITED

NEW ISSUE OF SHARES TO MEMBERS

DEVELOPMENT OF COLUMBITE AREAS

The Directors of Gold and Base Metal Mines of Nigeria Ltd. have announced by Circular Letter and Letter of Rights to Members that they are issuing the balance of the unissued capital of the Company to provide £218,273 of new money for the purpose of carrying out the development programme for the expansion of the Company's columbite properties in Nigeria. These funds will enable the Company to meet its commitments under the Loan Contracts entered into, or to be entered into, with the United States Government; to replace working capital and to permit payments to be continued on account of the cash consideration payable to the vendors of the columbite areas recently acquired. Members are offered the new shares of 2s. 6d. each at a price of 2s. 9d. in the proportion of four new shares for every seven units now held.

In March last it was announced that the Company had acquired certain leases to mine for columbite and tin in the Liruei-n-Kano District of Northern Nigeria which, with the Company's existing leases, make a compact block covering over five square miles.

The Company, with its Associates, signed a Contract with the United States Government, acting through the Defense Materials Procurement Agency for the sale of its estimated columbite production for the year 1953 at a price equivalent of £2,252 per short ton. This Contract was for the year 1953 only. A further Contract was signed early in October for deliveries commencing at the expiry of the first Contract and continuing until December 31, 1956. The price for deliveries under this new Contract is £2,180 per short ton containing 73 per cent grade delivered by June 30, 1955, and £2,107 per short ton delivered between July 1, 1955, and December 31, 1956.

It is estimated that deliveries under this Contract will have a value well in excess of £1,000,000 and, as a result, profits of the Company under this Contract should show a material increase.

Owing to the scarcity of columbite, which is indispensable in highest temperature super alloy steel such as is demanded in the castings used in jet engines and gas turbines, the Government of the United States of America has been using every endeavour to encourage the expansion of its production.

On April 23, 1953, a contract was signed with the United States Government for an advance of £250,000 to finance development and equipment of the Liruei-n-Kano areas. The Company is required to spend £100,000 on these areas in step with advances made by the U.S. Government. Sums advanced carry interest at 5 per cent per annum and are repayable by June 30, 1956, in kind by deliveries of columbite. Advances already made, covering the period to December 31, 1953, total £142,750.

In addition to areas at Liruei-n-Kano, the Company has in the last few years obtained a very small annual production of columbite from its Rishi leases. The Company now holds in this district mining leases covering over 1,500 acres, together with exclusive prospecting licences over a further three square miles. Application has already been made to the United States Government for a further loan of £100,000 to complete the expansion programme in these areas.

The Company has now become one of the larger producers of columbite, with an anticipated production of 200 s.tons per annum by 1955. At September 30, 1953, the total indicated ore reserves on the Company's leases in the Liruei and Rishi districts totalled 1,025 s.tons.



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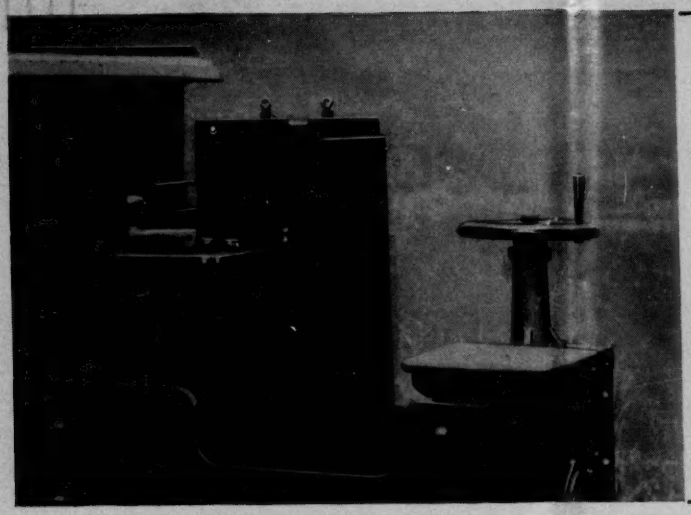
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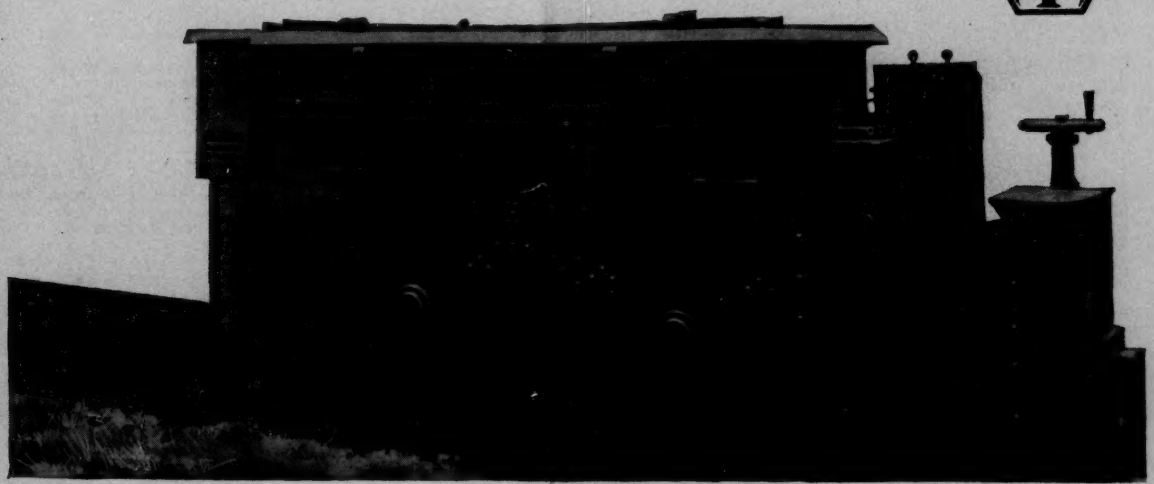


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